

AD-A188 188

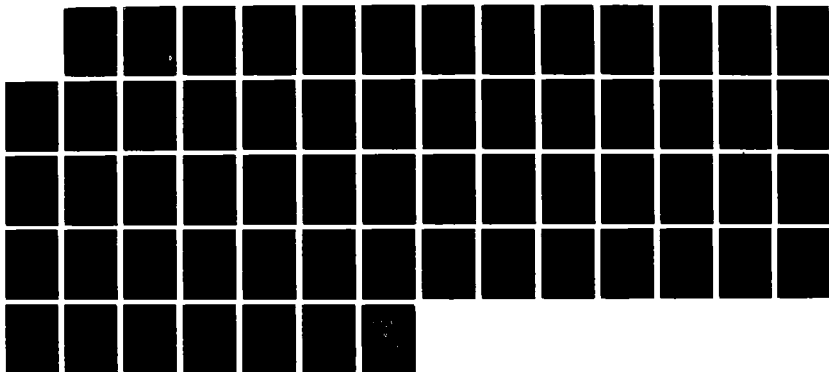
AN INVESTIGATION OF THE SERVICE WRITER METHODOLOGY IN
DIRECTORATE OF ENGI. (U) LITTLE (ARTHUR D) INC
CAMBRIDGE MA C M SNYDER ET AL. SEP 87 CERL-TR-P-87/16
F/G 5/3

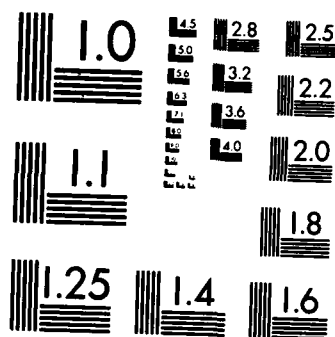
1/1

UNCLASSIFIED

DACA88-86-D-0015

NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



US Army Corps
of Engineers
Construction Engineering
Research Laboratory

USA-CERL TECHNICAL REPORT P-87/16
September 1987

2

AD-A188 180

An Investigation of the Service Writer Methodology in Directorate of Engineering and Housing Vehicle Maintenance Shops

by
Carla Mond Snyder
Todd O. Burger

This research was to determine the effects of the Service Writer Methodology on responsiveness and turnaround time in Directorate of Engineering and Housing (DEH) vehicle maintenance shops and to collect data on productive, indirect productive, and nonproductive time to be used in a draft staffing guide currently being developed. The process was investigated at the DEH maintenance activities at Fort Riley, KS and Fort Bragg, NC.

Contractor human factors engineers observed and recorded work activities and collected data on maintenance, labor, and parts costs. An analysis was then made to compare costs of the Service Writer process with those generated following the guidance of The Army Maintenance Management System (TAMMS). Test results show that the Service Writer Methodology reduced labor costs by 13.5 percent and total maintenance costs by 6.4 percent.

Approved for public release; distribution is unlimited.

DTIC
ELECTE
NOV 17 1987
S & E D

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official indorsement or approval of the use of such commercial products. The findings of this report are not to be construed as an official Department of the Army position, unless so designated by other authorized documents.

***DESTROY THIS REPORT WHEN IT IS NO LONGER NEEDED
DO NOT RETURN IT TO THE ORIGINATOR***

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE

AD-A188180

REPORT DOCUMENTATION PAGE

Form Approved
OMB No 0704 0188
Exp Date Jun 30 1986

| | | | |
|--|--|--|---------------------------------------|
| 1a REPORT SECURITY CLASSIFICATION UNCLASSIFIED | | 1b RESTRICTIVE MARKINGS | |
| 2a SECURITY CLASSIFICATION AUTHORITY | | 3 DISTRIBUTION/AVAILABILITY OF REPORT Approved for public release; distribution is unlimited. | |
| 2b DECLASSIFICATION/DOWNGRADING SCHEDULE | | | |
| 4 PERFORMING ORGANIZATION REPORT NUMBER(S) USA-CERL TR P-87/16 | | 5 MONITORING ORGANIZATION REPORT NUMBER(S) | |
| 6a NAME OF PERFORMING ORGANIZATION Arthur D. Little, Inc. | 6b OFFICE SYMBOL (If applicable) | 7a NAME OF MONITORING ORGANIZATION U.S. Army Construction Engr Research Laboratory | |
| 6c ADDRESS (City, State, and ZIP Code) Cambridge, MA 02140 | | 7b ADDRESS (City, State, and ZIP Code) P.O. Box 4005 Champaign, IL 61820-1305 | |
| 8a NAME OF FUNDING/SPONSORING ORGANIZATION Office of the Chief of Engr | 8b OFFICE SYMBOL (If applicable) DAEN-ZCF-B | 9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER Contract Order DACA88-86-D-0015; Reg. No. CERL-ES-85-262, #A014: (Cont'd) | |
| 8c ADDRESS (City, State, and ZIP Code) 20 Massachusetts Ave., N.W. Washington, D.C. 20314-1000 | | 10 SOURCE OF FUNDING NUMBERS | |
| | | PROGRAM ELEMENT NO | PROJECT NO |
| | | TASK NO | WORK UNIT ACCESSION NO |
| 11 TITLE (Include Security Classification) An Investigation of the Service Writer Methodology in Directorate of Engineering and Housing Vehicle Maintenance Shops (Unclassified) | | | |
| 12 PERSONAL AUTHOR(S) Snyder, Carla Mond, Burger, Todd O. | | | |
| 13a TYPE OF REPORT Final | 13b TIME COVERED FROM _____ TO _____ | 14 DATE OF REPORT (Year, Month, Day) September 1987 | 15 PAGE COUNT 58 |
| 16 SUPPLEMENTARY NOTATION Copies are available from the National Technical Information Service Springfield, VA 22161 | | | |
| 17 COSATI CODES | | 18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number) | |
| FIELD | GROUP | SUB-GROUP | |
| 05 | 03 | | |
| 15 | 05 | | |
| | | Directorate of Engineering and Housing Service Writer Methodology vehicles (Cont'd) | |
| 19 ABSTRACT (Continue on reverse if necessary and identify by block number) | | | |
| <p>This research was to determine the effects of the Service Writer Methodology on responsiveness and turnaround time in Directorate of Engineering and Housing (DEH) vehicle maintenance shops and to collect data on productive, indirect productive, and nonproductive time to be used in a draft staffing guide currently being developed. The process was investigated at the DEH maintenance activities at Fort Riley, KS and Fort Bragg, NC.</p> <p>Contractor human factors engineers observed and recorded work activities and collected data on maintenance, labor, and parts costs. An analysis was then made to compare costs of the Service Writer process with those generated following the guidance of The Army Maintenance Management System (TAMMS). Test results show that the Service Writer Methodology reduced labor costs by 13.5 percent and total maintenance costs by 6.4 percent. —</p> | | | |
| 20 DISTRIBUTION/AVAILABILITY OF ABSTRACT <input type="checkbox"/> UNCLASSIFIED UNLIMITED <input checked="" type="checkbox"/> SAME AS RPT <input type="checkbox"/> DTIC USERS | | 21 ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED | |
| 22a NAME OF RESPONSIBLE INDIVIDUAL Gloria Wienke | | 22b TELEPHONE (Include Area Code) (217) 352-6511 (x353) | 22c OFFICE SYMBOL CECER-INT |

DD FORM 1473, 84 MAR

If APR edition may be used until exhausted
All other editions are obsolete

UNCLASSIFIED

UNCLASSIFIED

BLOCK 9 (Cont'd)

Delivery Order No. 11

BLOCK 18 (Cont'd)

maintenance
productivity

UNCLASSIFIED

FOREWORD

This research was performed for the Office of the Chief of Engineers (OCE) under the Operations and Maintenance, Army, Facilities Technology Applications Test Program. The research was directed by the U.S. Army Construction Engineering Research Laboratory (USA-CERL) and conducted by Arthur D. Little, Inc., Cambridge, MA. The Contract Order No. is DACA88-86-D-0015; Registration No. CERL-ES-85-262, #A014: Delivery Order No. 11, "Investigation of the Service Writer Operations in DEH Vehicle Maintenance Shops at Fort Bragg, NC and Fort Riley, KS." USA-CERL's Contract Monitor was Mr. Robert Blackmon. The OCE Technical Monitor was Mr. Walter Seip, DAEN-ZCF-B.

This investigation was performed by Carla Mond Snyder, Todd Burger, Kirk Goodall, Marion Wentworth, and Tom Parrish of Arthur D. Little, Inc. The Technical Editor was Gloria J. Wienke, Information Management Office.

The cooperation of the Directorate of Engineering and Housing (DEH) equipment maintenance personnel at Fort Bragg and Fort Riley is gratefully acknowledged.

COL Norman C. Hintz is Commander and Director of USA-CERL, and Dr. L. R. Shaffer is Technical Director.

| | |
|--------------------|--|
| Accession For | |
| NTIS GRA&I | <input checked="checked" type="checkbox"/> |
| DTIC TAB | <input type="checkbox"/> |
| Unannounced | <input type="checkbox"/> |
| Justification | |
| By _____ | |
| Distribution/ | |
| Availability Codes | |
| Dist | Avail and/or Special |
| A-1 | |



CONTENTS

| | Page |
|---|------|
| DD FORM 1473 | 1 |
| FOREWORD | 3 |
| LIST OF FIGURES AND TABLES | 5 |
| 1 INTRODUCTION | 7 |
| Background | |
| Objectives | |
| Approach | |
| Scope | |
| Mode of Technology Transfer | |
| 2 METHODS | 9 |
| General | |
| Selection of Test Site | |
| Test Parameters and Duration | |
| Data Collection | |
| 1986 Data Base | |
| 3 RESULTS AND ANALYSIS | 13 |
| Labor Costs | |
| Reconstruction of TAMMS Costs | |
| Comparison of Service Writer and TAMMS Costs | |
| A Sensitivity Analysis | |
| Time-and-Motion Observation Results | |
| 4 CONCLUSIONS AND RECOMMENDATION | 15 |
| Conclusions | |
| Recommendation | |
| APPENDIX A: Flow Charts | 16 |
| APPENDIX B: Data Collection Plan | 23 |
| APPENDIX C: Sample Data Collection Forms | 31 |
| APPENDIX D: Task Descriptions of the 10 Vehicles with the Highest Number of Repair Tasks Performed | 35 |
| APPENDIX E: Summary Data Tables | 48 |
| APPENDIX F: Job Frequency by Vehicle Number and Number of Jobs Performed | 55 |
| DISTRIBUTION | |

FIGURES

| Number | | Page |
|--------|---|------|
| A1 | The Army Maintenance Management System (TAMMS) Approach | 16 |
| A2 | Service Writer Concept | 18 |
| A3 | Flow Chart of Maintenance Operations at Fort Riley, KS | 20 |
| A4 | File Processing Flow for Repair Task Data | 22 |

TABLES

| | | |
|----|---|----|
| C1 | Raw Data Collected: Vehicle 1 | 31 |
| C2 | Raw Data Collected: Vehicle 2 | 33 |
| E1 | Breakdown of Service Visits | 48 |
| E2 | Vehicle Maintenance Labor Hours and Costs for Fort Riley, KS (1986) | 49 |
| E3 | Vehicle Maintenance Parts and Labor Dollars and Labor Hours for Fort Riley, KS (1986) | 50 |
| E4 | Vehicle Maintenance Unit and Support Costs for Fort Riley, KS (1986) | 51 |
| E5 | Reconstruction of TAMMS Process Costs | 52 |
| E6 | Comparison of Service Writer and TAMMS Process Costs | 53 |
| E7 | Analysis of Time-In-Motion Observations by Repair Type and Type of Maintenance Action | 54 |
| E8 | Summary of Time-And-Motion Study | 54 |

AN INVESTIGATION OF THE SERVICE WRITER METHODOLOGY IN DIRECTORATE OF ENGINEERING AND HOUSING VEHICLE MAINTENANCE SHOPS

1 INTRODUCTION

Background

Current work processes at maintenance activities involve redundant inspections and lack a central location for receipt and work authorization on a vehicle. Previous investigations of the Directorate of Engineering and Housing (DEH) equipment maintenance activities on U.S. Army installations indicated opportunities to increase the productivity of operations.¹ One opportunity was to use the Service Writer Methodology. This is a process in which an individual (the Service Writer) is the single initial point of contact between a vehicle operator and the maintenance organization, and a mechanic is responsible for analyzing the problem (inspecting the vehicle) and accomplishing the related work. The mechanic is also responsible for both the workmanship and timely completion of the job.

The Office of the Chief of Engineers (OCE) asked the U.S. Army Construction Engineering Research Laboratory (USA-CERL) to investigate this methodology and compare the results to a model employing The Army Maintenance Management System (TAMMS) as detailed in Department of the Army Pamphlet (DA PAM) 738-750.²

The obvious dissimilarities between the DEH equipment maintenance workforce and their troop unit soldier counterparts offers opportunities for increasing productivity of the workforce. The most dramatic difference is in work experience. TAMMS has a tactical orientation and must accommodate a young workforce of soldiers who recently graduated from their first exposure to equipment maintenance. Because journeyman level performance cannot be expected from these soldiers, additional supervision and quality control (inspection) is part of TAMMS. On the other hand, the average DEH mechanic is about 50 years old and has the maintenance expertise associated with years of experience. The Service Writer Methodology provides an opportunity to take full advantage of this expertise by placing more responsibility on the mechanics. Mechanics inspect the incoming vehicles, determine the work to be accomplished, perform the work, and check their work before releasing the vehicles to operators. This assignment of responsibilities eliminates the need for full-time inspectors and a formal inspection procedure, and results in reduced cost and improved turnaround time.

¹P. J. Tanner and K. R. Aytogu, *A Model for Analysis of Alternative Performance Structures for Vehicle Maintenance Functions of the U.S. Army Installation Directorates of Engineering and Housing*, Technical Report P-86/07/A169716 (DEH Equipment Maintenance Management, June 1986); P. J. Tanner and K. R. Aytogu, *Vehicle Maintenance Manpower Requirements for U.S. Army Installation Directorates of Engineering and Housing Based on Air Force, Navy, and Army Reserves' Staffing Techniques*, Interim Report P-86/09/A172181 (DEH Equipment Maintenance Management, July 1986).

²DA PAM 738-750, *The Army Maintenance Management System (TAMMS)*, Change 8 (Headquarters, Department of the Army [HQDA], 1 December 1983).

During FY86, current Army staffing guides for vehicle maintenance shops were compared with Air Force and Army Reserve staffing guides. During FY87, the investigation was extended to include Navy staffing guides. While some comparisons could be made, the data available from Army maintenance activities was insufficient to complete the comparisons and develop a draft staffing guide for the Army. Detailed field data collected and analyzed in this project will be used to satisfy part of the data required in the draft staffing guide.

Objectives

The objectives of this study were: (1) to determine the effects of the Service Writer process on responsiveness and turnaround time in the DEH vehicle maintenance shops, and (2) to collect data for estimating productive, indirect productive, and nonproductive time of maintenance activities performed by shop mechanics for use in a draft staffing guide currently under development.

Approach

The Service Writer concept was evaluated through a series of four tasks: (1) test planning, (2) development of test parameters, (3) data collection, and (4) data analysis.

The initial approach included collecting and combining performance data from two DEH installations to generate a representative sample of maintenance operations. Human factors engineers were to investigate vehicle maintenance operations at both installations through interviews and observations of actual operations. A copy of all maintenance work orders completed during the past 12 months was to be obtained from both installations. This information was to be analyzed to determine the number of unit and support repair tasks, labor costs, and parts costs.

Scope

This study is an analysis of the effect of the Service Writer concept on the responsiveness and turnaround time of DEH vehicle maintenance shops. It is not an investigation of shop management, repair methods, or the productivity of individual mechanics. This study is applicable to DEH shops performing maintenance with in-house mechanics.

Mode of Technology Transfer

Results of this analysis will be used to determine the appropriateness of the Service Writer concept for all DEH organizations. The results will be transferred through publication of this report and other documents prepared by OCE. Data on productive, indirect productive, and nonproductive time will be used in a draft staffing guide currently being developed.

2 METHODS

General

A realistic evaluation of the Service Writer concept would involve selecting a test installation, reorganizing the vehicle maintenance shop, and analyzing operations after a short period of time. However, such an approach would cause personnel problems and possibly bias the results. While seeking an alternative approach, an investigation of actual field operations identified Fort Bragg, NC and Fort Riley, KS as possible field sites since each activity had independently implemented a version of the Service Writer Methodology.

The TAMMS process for operating a vehicle maintenance shop was investigated with emphasis on identifying all activities, interfaces, decision points, and personnel responsibilities. The TAMMS process is illustrated in Figure A1. A description of the Service Writer concept (Figure A2) was detailed and compared with the TAMMS process to identify the differences.

Responsibilities of the Inspector in TAMMS are divided between the Service Writer and the Mechanics in the Service Writer concept. Army Regulation (AR) 750-1³ classifies maintenance work as either unit or support level maintenance. Unit level maintenance includes routine services and component replacement which require only small hand tools, no major diagnostic effort, and generally require few man-hours. Intermediate direct support level maintenance includes all nonroutine repairs that often require bench tools, significant diagnostic efforts, and more man-hours. Support level maintenance is often accomplished by another maintenance activity.

Selection of Test Site

During the test planning activities, vehicle maintenance operations were investigated at Fort Bragg, NC and Fort Riley, KS to determine if data from these installations would meet the analysis requirements. Both installations were using a variation of the Service Writer concept.

The initial approach included collecting and analyzing data from both installations to reduce the possibility of site bias. However, this approach was not feasible due to the dissimilarities between the two installations. Specifically, the shops do not have a similar layout; the Fort Riley shop is located in a single building requiring minimum walking to reach all functional areas, and the Fort Bragg shop is located in several buildings. The Clerk/Service Writer is located in one building, maintenance is performed in several other buildings, and parts inventory is in yet another building. Because the process at Fort Bragg is longer due to the separation of functions, test results could not be directly compared to other installations. Therefore, Fort Riley was selected as the representative test site.

Operations at both shops were identified through interviews and observations. Flow charts describing the maintenance process at Fort Riley are shown in Figure A3. Allowing for the difference in functions, the processes are very similar.

³AR 750-1, *Army Materiel Maintenance Concepts and Policies*, Change 4 (HQDA, 1 May 1986).

Test Parameters and Duration

Test parameters were identified based on the requirement to determine:

1. The average total time (in hours) for a mechanic to complete inspection and repair of a unit level maintenance case, and
2. The average total time (in hours) for a mechanic to complete inspection and repair of a support level maintenance case.

The original program plan required 3 days of data collection in each shop for a combined test sample of 6 days. Because data from Fort Bragg would not be representative of most maintenance shops, the plan was changed to 6 days of data collection at Fort Riley.

Data Collection

Human factors engineers prepared the data collection plan for the study (Appendix B). The plan specified that two test engineers would observe and collect data for 6 work days. Six heavy mobile equipment repairers would be the test subjects. The plan also specified the data collection forms. The mechanic's activities were recorded as directly productive, indirectly productive, and nonproductive.* As additional activities were observed, they were added to the forms by the test engineers. The senior human factors engineer classified the additional tasks.

The field study was conducted during the week of 17 November 1986. Tables C1 and C2 present examples of the raw data collected during the field study. The following information was recorded at the top of each report:

Test Engineer's Name
Mechanic's Name
Date of Observation
Vehicle Being Maintained
Vehicle Type (Heavy Equipment, Automotive Equipment,
Seasonal Equipment, Generators)
Start Time
End Time
Maintenance Type (Unit or Support)

The operational data were collected by each observer monitoring the activities of one mechanic during an 8-hr working period. Activities were described by sequence number, time required to complete, productivity category, and a description of the activity. Additional space for comments was provided.

*Directly productive labor applies directly to the workload; i.e., the repair task. Indirectly productive labor, because it is incurred for common or joint objectives, is not readily subject to treatment as productive labor. Nonproductive is the time not expended on the workload (i.e., eating lunch and cleaning the work area or hands).

1986 Data Base

The Fort Riley DEH provided a data base containing the maintenance work orders completed in the shop over a 12-month period. The material contained 34 individual files formatted for FRAMEWORK, a PC-based spread sheet program. These files were translated into Lotus "WR1" Symphony format for the analysis. The steps involved in this process are depicted in Figure A4. Editing was limited to format changes needed to improve the consistency between files. The files reported approximately 16,000 repair tasks. The data is summarized in Appendix D.

Each task was coded as unit or support level maintenance using the criteria provided in AR 750-1. The coding was done at the repair task level. Service visits generally included more than one task and could require both unit and support level tasks. The data were then analyzed to determine the number of service visits for unit repair tasks only, for support repair tasks only, and for a combination of unit and support repair tasks. Results of this analysis are summarized in Table E1.

A total of 15,609 repair tasks were completed during 3,940 service visits (an average of 4 per visit). Of the 3,940 visits, 2,862 consisted only of unit repairs, 165 consisted only of support repairs, and 913 consisted of both unit and support repair tasks; hence, 1,078 visits had a support level component.

The data were analyzed to determine the effects of the Service Writer process on productivity in terms of:

1. The total annual cost of the mechanic's repair and inspection time for unit level cases
2. The total annual cost of the mechanic's repair and inspection time for support level case
3. The total annual cost of repair and inspection for the Service Writer process (sum of 1 and 2 above)
4. The total annual cost of the inspector's time for unit level cases if TAMMS was followed
5. The total annual cost of the mechanic's time for unit level cases if TAMMS was followed
6. The total annual cost associated with the inspector's time and mechanic's time for unit level cases if TAMMS was followed (sum of 4 and 5 above)
7. The total annual cost of inspector's time for support level cases if TAMMS was followed
8. The total annual cost of mechanic's time for support level cases if TAMMS was followed
9. The total annual cost associated with the inspector's and mechanic's time for support level cases if TAMMS was followed (sum of 7 and 8 above)
10. The total annual cost of inspection and repair if TAMMS was followed (sum of 6 and 9 above)

11. The cost savings resulting from the Service Writer process (difference between 10 and 3 above)
12. The percentage of annual savings resulting from the Service Writer process
13. The average percentage of indirectly productive time for a mechanic in an 8-hr working period
14. The average percentage of directly productive time for a mechanic in an 8-hr working period
15. The average percentage of nonproductive time for a mechanic in an 8-hr working period.

3 RESULTS AND ANALYSIS

Labor Costs

Frequently, the labor cost was not reported for a repair task, even though the task indicated that some labor had been expended. As a result, the reported labor cost, referred to in Table E2 as the "unadjusted labor dollars" does not reflect the total labor cost. Missing data were calculated by multiplying the relevant labor hours by the standard average labor rate of \$16.76. Table E3 summarizes total parts, labor hours, and adjusted labor dollars. Table E4 combines parts and adjusted labor dollars under unit and support maintenance categories.

Reconstruction of TAMMS Costs

Since actual field data was not available, the costs of the TAMMS process were reconstructed. The reconstruction process is outlined in Table E5. Beginning with current Service Writer data, costs related to inspection activities were deleted and estimates of inspections costs under TAMMS were incorporated. The following two approaches for identifying and estimating inspection costs from the Service Writer process costs were considered:

1. Assume the task descriptions of "inspection" and "diagnosis" in the 1986 records were accurate and included all inspection costs. Summarize the cost for these items and subtract it from the total cost of the Fort Riley operations
2. Determine the percentage of total costs pertaining to the inspection/diagnosis labor costs identified in the time-and-motion study and reduce the total annual cost accordingly.

The second approach was used in the analysis. Estimates of TAMMS repair costs were developed based on Service Writer costs less inspection costs, using the following criteria from Tanner and Aytogu, June 1986 and July 1986:

- When a service visit entailed only unit repair tasks, 1.5 hr were added to the labor effort for inspection
- When a service visit entailed only support repair tasks, 2 hr were added to the labor effort for inspection
- When a service visit entailed both unit and support repair tasks, 2 hr were added to the labor effort for inspection (not 3.5 hr)
- One "service visit" as reported on a completed work document was assumed to be equivalent to a "case" referred to in the "Vehicle Maintenance Manpower" report⁴ that provided the inspection time estimates on a per-case basis
- The standard average mechanic labor rate of \$16.76 was applied to the total inspection hours and the results were used to adjust the annual cost estimate.

⁴P. S. Tanner and K. R. Aytogu (July 1986).

The data were tested for a possible relationship between reduced inspection time and the quality of repair work performed. If, as a result of lowered inspection levels, vehicles required repeat repairs of the same subsystem due to poor workmanship, repair costs might actually increase using the Service Writer process. The 1986 data was reviewed to determine if any of the vehicles had an excessive number of service visits (Appendix F). On the average, four repair tasks were accomplished each visit. During the year, some vehicles had as few as 2 repair tasks while others had over 100 repair tasks performed. The repair records for the 10 vehicles with the highest number of repair tasks were reviewed. An effort was made to identify multiple repairs for the same problem over a period of a year. While the effort was hampered by inconsistent repair descriptions, there was no clear pattern to indicate a quality control problem. Based on these data, there is no evidence that the reduced inspection efforts inherent in the Service Writer process have led to increased failure rates or deterioration in the quality of service performed.

Comparison of Service Writer and TAMMS Costs

Based on the data gathered, total unit and support maintenance costs were compared (Table E6). The Service Writer Methodology reduced the total maintenance cost by 6.4 percent and labor cost by 13.5 percent at Fort Riley.

A Sensitivity Analysis

A sensitivity analysis was done on the estimated cost reductions. These numbers would not change significantly even if the estimate of current inspection effort were off by a large margin. For example, if Service Writer unit and support inspection costs were understated by 20 percent, the labor cost savings would fall from 13.5 to 12.8 percent. Similarly, the cost savings is relatively insensitive to the breakdown between support level and unit level repairs. If the fraction of support level repairs were underestimated by 20 percent, the labor cost savings would rise from 13.5 to 13.9 percent.

Time-and-Motion Observation Results

Time-and-motion observations from the Fort Riley vehicle maintenance shop are summarized in Table E7. Sixty seven percent of the mechanic's time was spent on unit repair tasks and nearly 5 percent of unit repair time was for inspection and diagnosis. Inspection and diagnosis time were approximately 1 percent of support repair time, reflecting both the higher labor content of support repair tasks and the greater ease of diagnosing major vehicle subsystem failures. Table E8 summarizes key findings; it is a simplified version of Table E7.

It should be noted that this data overstates the productivity of the mechanics due to the Hawthorne Effect and may require adjustment before being used in the draft staffing guide. (The Hawthorne Effect is the increased productivity observed in workers when they know they are being studied.)

4 CONCLUSIONS AND RECOMMENDATION

Conclusions

The Service Writer Methodology is viable and has reduced labor costs by 13.5 percent and total maintenance costs by 6.4 percent at Fort Riley, KS. The methodology decreases turnaround time and improves the responsiveness of the DEH shops to mission requirements.

The use of a Service Writer and increasing the responsibilities of the mechanics does not result in increased failure rates.

The process provides an opportunity for a better interface between the DEH and its customers through the Service Writer.

The study provided data on the distribution of the mechanic's time for use in the draft staffing guide. This data overstates the productivity of the mechanics and may require adjustment before further use.

Based on the observed conditions of data, a system should be developed and implemented for systematically collecting vehicle maintenance and failure data. This system should simplify the collection of maintenance management data, including the possible use of codes for repair tasks. Tracking the use of repair parts should also be included in the system.

Recommendation

The Service Writer process should be considered for incorporation into all DEH vehicle maintenance shop operations to reduce maintenance cost and turnaround time.

APPENDIX A: FLOW CHARTS

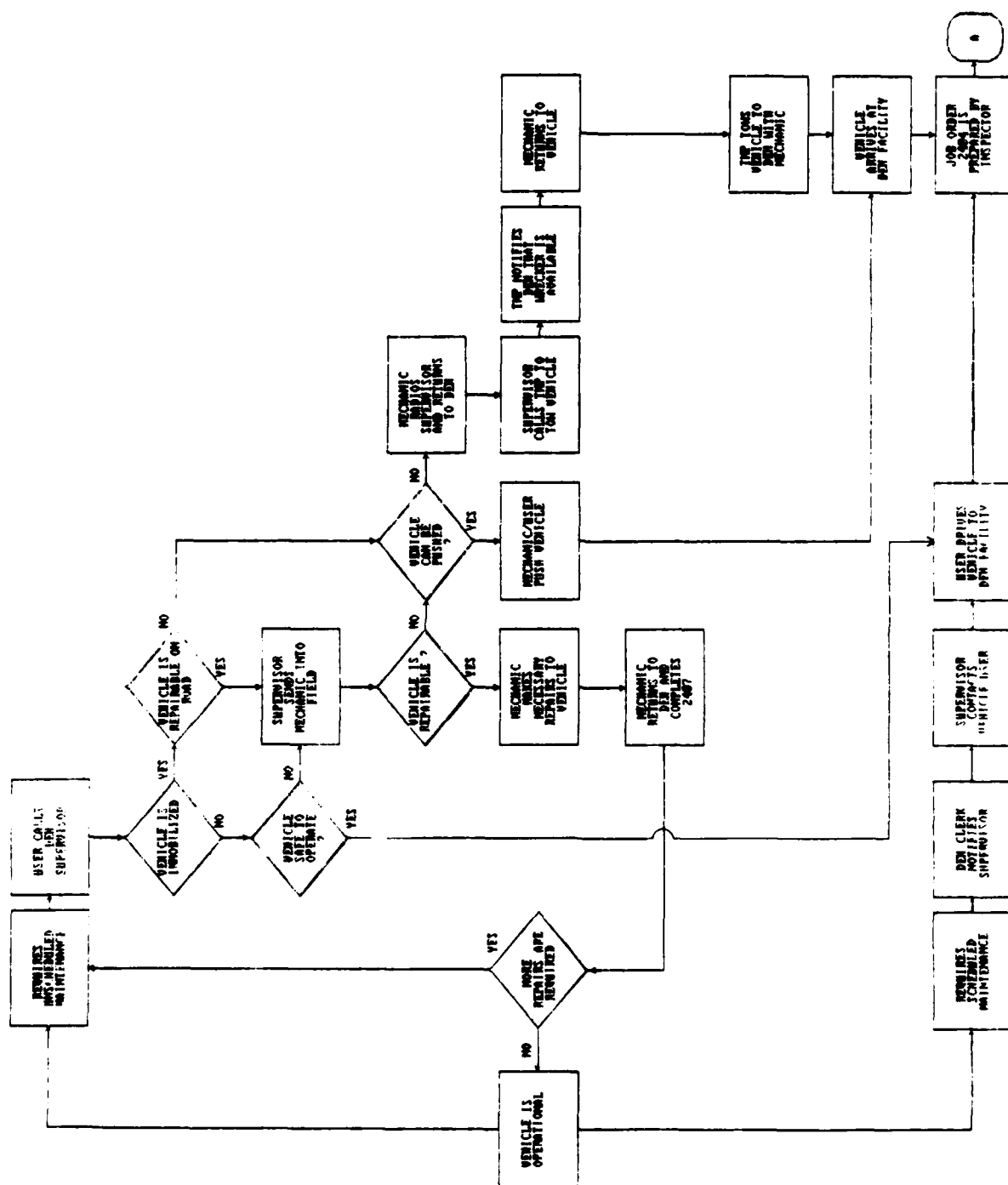


Figure A1. The Army Maintenance Management System (TAMMS) approach.

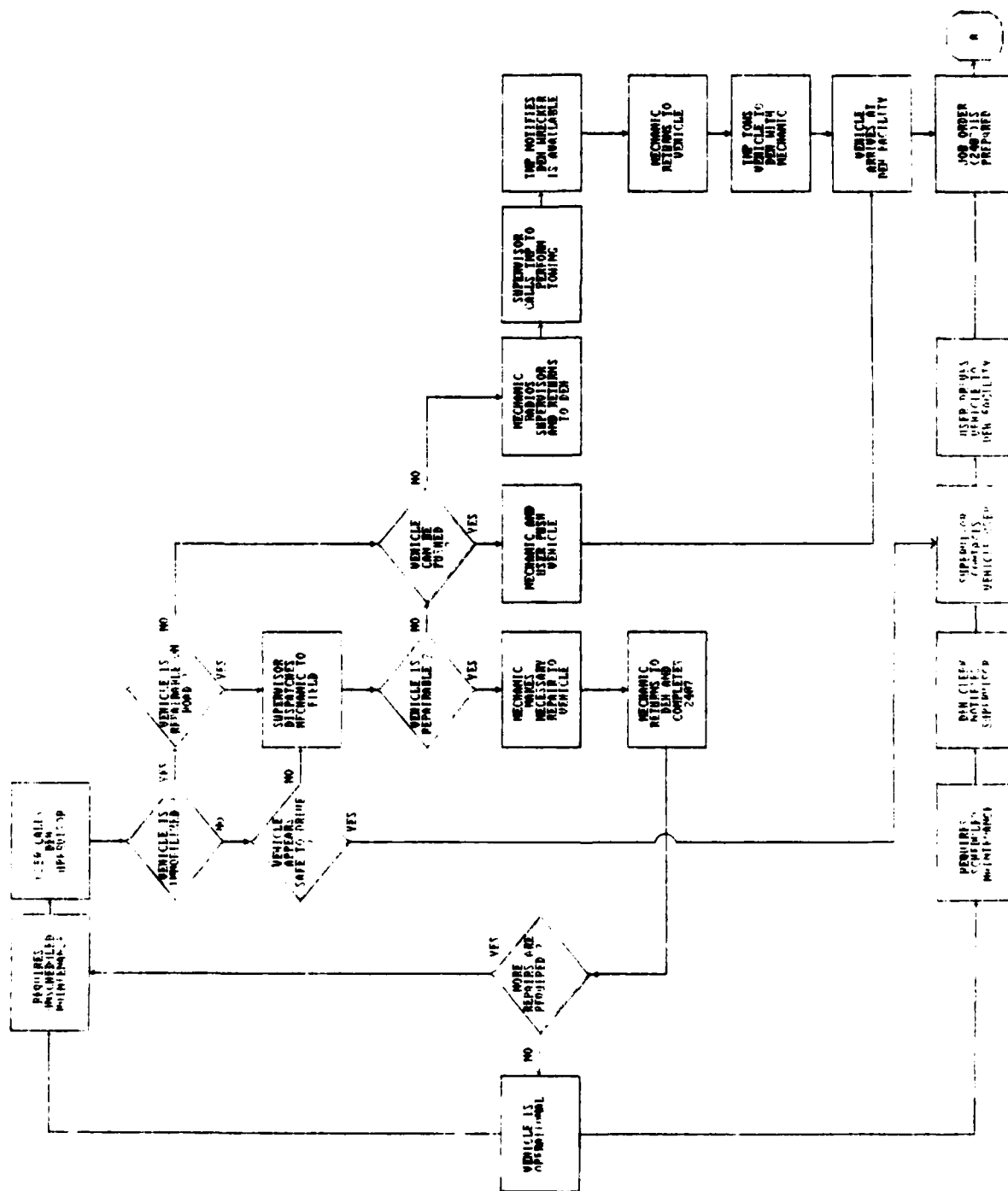


Figure A2. Service Writer concept.

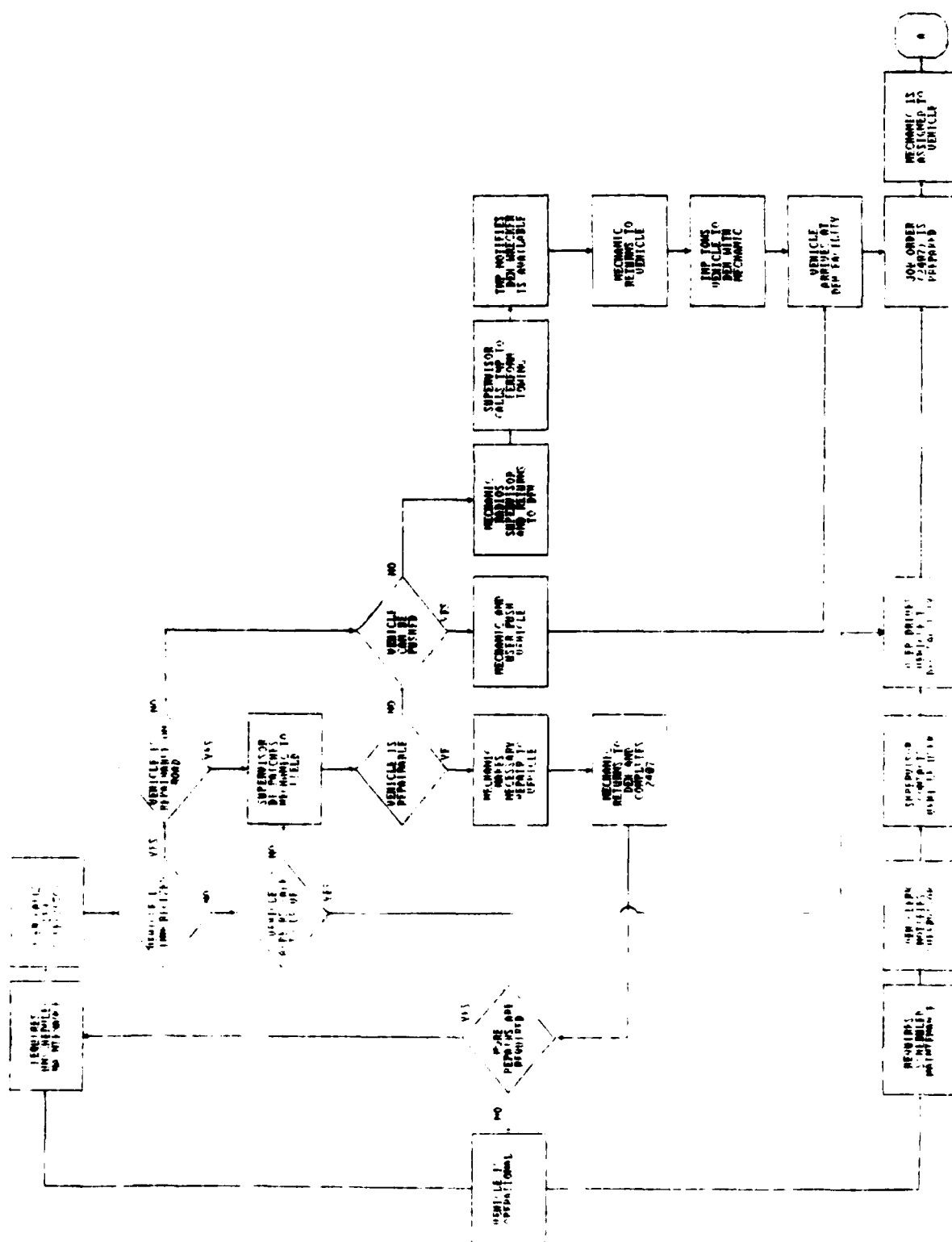


Figure A3. Flow chart of maintenance operations at Fort Riley, KS.

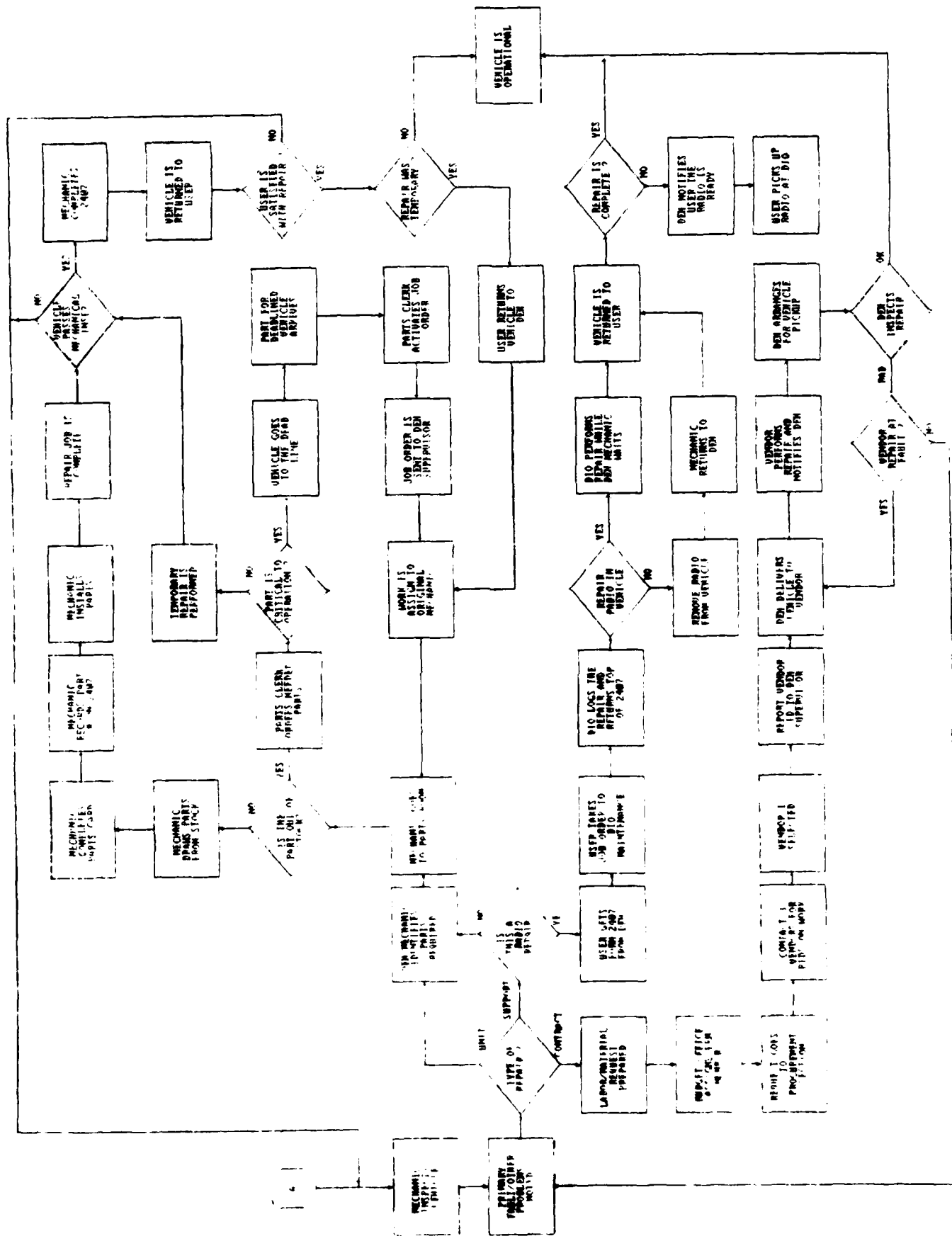


Figure A3 (Cont'd).

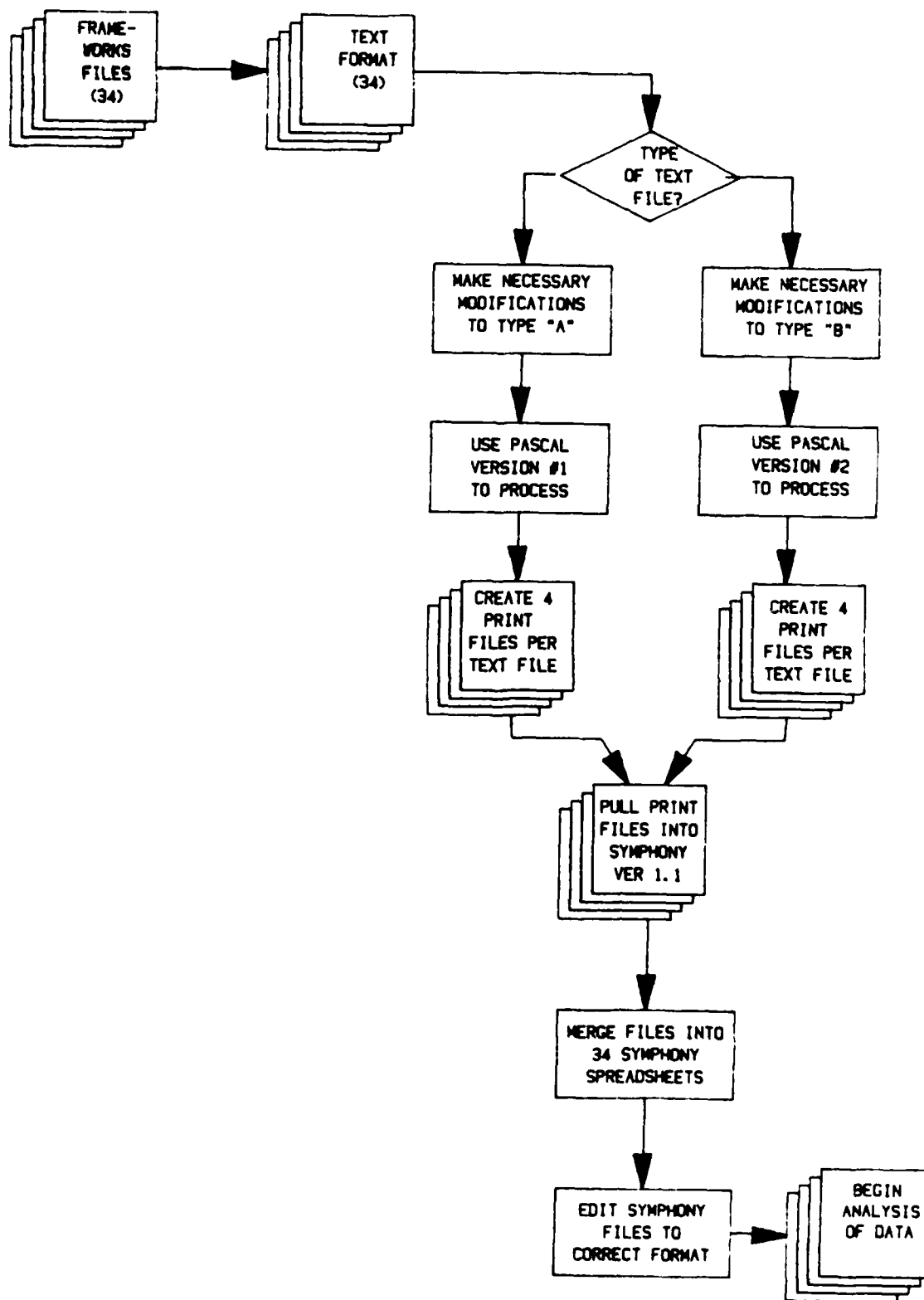


Figure A4. File processing flow for repair task data.

APPENDIX B: DATA COLLECTION PLAN

Contract No. DACA88-86-0075
Delivery Order No. 0011

INVESTIGATION OF THE SERVICE WRITER OPERATIONS IN
DEH VEHICLE MAINTENANCE SHOPS AT FORT RILEY, KS

Task 2, Data Collection Plan

Prepared for

US ARMY CONSTRUCTION ENGINEERING RESEARCH LAB
INTERSTATE RESEARCH PARK
CHAMPAIGN, ILLINOIS 61820-1305

Prepared by

ARTHUR D. LITTLE, INC.
CAMBRIDGE, MA 02150

ADL Reference: 55119-19

November 1986

INVESTIGATION OF SERVICE WRITER METHODOLOGY

DATA COLLECTION PLAN

1. INTRODUCTION

Investigations of the DEH equipment maintenance process at U.S. Army installations by the U.S. Army Construction Engineering Research Laboratory (USA-CERL) indicated opportunities to increase the productivity of the operations. Current work processes involve redundant inspections without a central location for receipt and work authorization on a vehicle. The Service Writer Methodology is a process by which an individual (the service writer) acts as the single initial point of contact between a vehicle operator and a maintenance organization. USA-CERL was tasked to investigate this methodology by studying the operations at Fort Bragg, NC and Fort Riley, KS. Based on the results of the initial field visits to these sites, it was decided that only Fort Riley would be included in this program.

2. PURPOSE

The purpose of this protocol is to define the data collection plan for developing estimates of productive, indirect productive and non-productive time for maintenance personnel.

3. OBJECTIVE

The objective of the field test is to provide data with which to develop estimates of staff time utilization for maintenance personnel as input to a staffing guide.

4. SCOPE

Fort Riley, KS will be the only test site for this activity. Data will be collected over a six day period by two test engineers from Arthur D. Little, Inc., Cambridge. The six heavy mobile equipment repairers (WG-5803-10) will be used as test subjects.

Productive, indirect productive, and non-productive time estimates will be obtained twice (see Table 1) for each of the maintenance personnel according to the data collection forms shown in Section 10 - Data Collection Forms. Depending on the work load conditions at Fort Riley during the week of testing, an effort will be made to obtain total time (in hours) for each of these mechanics to complete inspection and repair of both a unit and support level maintenance case.

5. TEST SCHEDULE

The test program is scheduled to begin on Monday, November 17, 1986 and proceed through Saturday, November 22, 1986. Monday through Friday testing will begin at 7:30 AM and conclude at 4:00 PM, whereas, on Saturday testing will proceed between 6:00 AM and 2:30 PM, to be consistent with the work shifts at Fort Riley. Table 1 depicts the idealized data collection schedule.

Again, it is noted that the ability to obtain data for both a unit and support level maintenance case for each mechanic is dependent on the nature of the work loading at Fort Riley during the week of November 17, 1986.

6. CERTIFICATION AND TEST RECORDS

At the conclusion of each day's testing, the data collection forms will be dated and initialed by the senior test engineer. Additional comments or observations on the testing will also be recorded, dated, and signed by the senior test engineer. Any photographs taken will also serve as test records. These records will be maintained by Arthur D. Little, Inc. for future reference and inspection by USA-CERL personnel.

TABLE 1

MAINTENANCE LEVEL CASE MIX

| <u>Day</u> | <u>Mechanic</u> | <u>Test Engineer</u> | <u>Maintenance Level Case</u> |
|------------|-----------------|----------------------|-------------------------------|
| Nov. 17 | 1 | 1 | 50% Unit; 50% Support |
| Nov. 17 | 2 | 2 | " Unit " " |
| Nov. 18 | 3 | 1 | " Unit " " |
| Nov. 18 | 4 | 2 | " Unit " " |
| Nov. 19 | 5 | 1 | " Unit " " |
| Nov. 19 | 6 | 2 | " Unit " " |
| Nov. 20 | 1 | 1 | " Support " " |
| Nov. 20 | 2 | 2 | " Support " " |
| Nov. 21 | 3 | 1 | " Support " " |
| Nov. 21 | 4 | 2 | " Support " " |
| Nov. 22 | 5 | 1 | " Support " " |
| Nov. 22 | 6 | 2 | " Support " " |

7. TEST CONDITIONS

Since testing will be done at the Fort Riley, KS vehicle maintenance facility, the test conditions will be standard ambient. Mid-day temperature readings will be obtained for each day of testing.

8. EQUIPMENT REQUIRED

Camera
2 Stop watches
Tape Measure
Data Collection Plan

9. PROTOCOL

As illustrated in Table 1, each test engineer will be assigned to a different mechanic each day of testing. Only the six heavy equipment repairers (WG-5803-10) will be used in this test program. The goal will be to obtain data, as per the forms described in Section 10, for both a unit and support level maintenance case for each mechanic. Achievement of this goal is strongly dependent on the work orders at Fort Riley during the week of November 17, 1986.

10. DATA COLLECTIONS FORMS

The forms that follow will be completed by the Arthur D. Little, Inc., test engineers during the course of the field test.

PROFILE OF MECHANICS

[illegible]

Test Engineer: _____

Date _____

Mechanic: _____

Vehicle: _____

HE SE AE G

Start Time: _____

End Time: _____

| <u>Task/Activity</u> | <u>Activity Order</u> | <u>Classification (P, IP, NP)</u> | <u>Time Elapsed</u> |
|--------------------------------|---------------------------|---------------------------------------|-------------------------|
| Obtain work order | | IP | |
| Talk to vehicle operator | | IP | |
| Move vehicles | | IP | |
| Obtain bay | | IP | |
| Walk to tools | | NP | |
| Select tools | | IP | |
| Diagnose problem | | P | |
| Prepare work order | | IP | |
| Modify work order | | IP | |
| Walk to parts inventory | | NP | |
| Obtain parts | | P | |
| Complete parts inventory forms | | NP | |

DATA COLLECTION FORM (Continued)

| <u>Task/Activity</u> | <u>Activity Order</u> | <u>Classification (P, IP, NP)</u> | <u>Time Elapsed</u> |
|---|---------------------------|---------------------------------------|-------------------------|
| Wait for tools | | NP | |
| Position vehicle for access | | P | |
| Position self with respect to vehicle | | P | |
| Repair | | P | |
| Request/Wait for assistance | | NP | |
| Prepare vehicle for temporary storage | | NP | |
| Inspect vehicle | | IP | |
| Complete work order | | IP | |
| Return work order to process control clerk | | IP | |
| Replace tools | | NP | |
| Clean work area | | IP | |
| Store replaced parts | | NP | |
| Repair/oil tools | | IP | |
| Clean hands | | NP | |
| Coffee Break | | NP | |
| Lunch Break | | NP | |

APPENDIX C: SAMPLE DATA COLLECTION FORMS

Table C1

Raw Data Collected: Vehicle 1

| | |
|------------------------------|--|
| Carla | (Test Engineer's Name) |
| George | (Mechanics Name) |
| 11/20/86 | (Date of Observation) |
| Fire Truck | (Vehicle Being Maintained) |
| HE | (Vehicle Type: Heavy Equip, Automotive Equip, Seasonal Equip, Generators) |
| Start/7:37 | (Start Time) |
| End/10:54 | (End Time) |
| L-Maintenance/Unit Level | (Maintenance Type: Unit or Support) |
| Vehicle was started 11/19/86 | |

| Sequence No. | Time | Category* | Description | Comments |
|--------------|-------|-----------|---------------------------|---|
| 1 | 1.60 | NP | give assistance | |
| 2 | 3.45 | NP | go to/from welding shop | |
| 3 | 1.80 | NP | go to/from welding shop | |
| 4 | 0.40 | NP | talk to supervisor | |
| 5 | 2.10 | NP | give assistance | |
| 6 | 1.75 | IP | select tools | |
| 7 | 4.00 | P | repair | l maint |
| 8 | 1.90 | NP | turn on outlet | includes walking |
| 9 | 14.90 | P | repair | |
| 10 | 0.30 | NP | walk to/from tools | |
| 11 | 0.35 | NP | replace tools | |
| 12 | 0.40 | NP | give assistance | |
| 13 | 0.25 | NP | walk to/ from tools | |
| 14 | 0.40 | P | repair | |
| 15 | 0.40 | NP | walk to/from tools | |
| 16 | 0.60 | NP | walk to/from tools | |
| 17 | 0.65 | P | repair | |
| 18 | 0.20 | NP | walk to/from tools | |
| 19 | 0.20 | NP | walk to/from tools | |
| 20 | 5.70 | P | repair | supervisor inspected unit/water pump |
| 21 | 0.35 | NP | walk to parts inventory | |
| 22 | 2.30 | P | obtain parts | |
| 23 | 0.60 | NP | walk from parts inventory | |
| 24 | 0.45 | NP | move tool box | |
| 25 | 0.20 | IP | select tools | |
| 26 | 68.00 | P | repair | replace belt to water pump |

*P = Productive.

NP = Nonproductive.

IP = Indirect productive.

Table C1 (Cont'd)

| Sequence No. | Time | Category* | Description | Comments |
|--------------|-------|-----------|--|--|
| 27 | 0.69 | NP | clean hands | |
| 28 | 17.00 | NP | coffee break | |
| 29 | 1.35 | P | repair | |
| 30 | 1.35 | NP | give assistance | |
| 31 | 0.30 | NP | walk to parts inventory | |
| 32 | 4.00 | NP | complete parts inventory forms | |
| 33 | 0.90 | NP | walk from parts inventory | included talking to vehicle operator |
| 34 | 6.00 | P | repair | changed tasks/battery |
| 35 | 2.50 | IP | talk to vehicle operator | |
| 36 | 1.00 | IP | talk to welder | |
| 37 | 1.50 | IP | select tools | talked to someone about tool box/welding tools |
| 38 | 2.90 | P | repair | |
| 39 | 2.90 | IP | clean work area | |
| 40 | 3.10 | IP | inspect vehicle | |
| 41 | 2.00 | IP | prepare work order | |
| 42 | 0.55 | NP | give assistance | |
| 43 | 4.60 | P | repair | |
| 44 | 1.25 | IP | move vehicles | |
| 45 | 2.00 | P | repair | |
| 46 | 6.80 | IP | road test | have to let vehicle warm up |
| 47 | 2.00 | NP | walk to /from tools | |
| 48 | 3.10 | NP | locate lost tool | |
| 49 | 1.00 | NP | replace tool | |
| 50 | 2.80 | IP | complete work order | at office |
| 51 | 0.10 | IP | return work order to process control clerk | |
| 52 | 0.60 | NP | walk to parts inventory | |
| 53 | 6.60 | NP | order parts | |
| 54 | 0.60 | NP | walk from parts inventory | |

END OF VEHICLE FOR NOW

*P = Productive.

NP = Nonproductive.

IP = Indirect productive.

Table C2

Raw Data Collected: Vehicle 2

Carla
George
11/20/86
Fire Truck
HE

(Test Engineer's Name)
 (Mechanics Name)
 (Date of Observation)
 (Vehicle Being Maintained)
 (Vehicle Type: Heavy Equip, Automotive Equip,
 (Seasonal Equip, Generators)
 (Start Time)
 (End Time)
 Maintenance Type: Unit or Support)

Start/10:55
End/3:50

Maintenance/Unit level

| Sequence No. | Time | Category* | Description | Comments |
|--------------|-------|-----------|--------------------------------|--|
| 1 | 1.60 | IP | move vehicles | got work order earlier from operator/see #36 from earlier same day |
| 2 | 1.20 | NP | walk to parts inventory | |
| 3 | 7.30 | P | obtain parts | |
| 4 | 0.55 | NP | complete parts inventory forms | |
| 5 | 0.54 | NP | walk from parts inventory | |
| 6 | 4.50 | P | repair | lights checked |
| 7 | 0.35 | NP | walk to parts inventory | |
| 8 | 0.30 | P | obtain parts | |
| 9 | 0.35 | NP | walk from parts inventory | |
| 10 | 9.70 | P | repair | |
| 11 | 0.80 | NP | discard replaced parts | oil |
| 12 | 37.60 | P | repair | gauge replaced/begin tredle valve job |
| 13 | 1.45 | NP | clean hands | |
| 14 | 54.00 | NP | lunch break | colonel spoke |
| 15 | 23.60 | P | repair | tredle valve |
| 16 | 4.80 | NP | give assistance | plumber checking on work order |
| 17 | 2.00 | P | repair | |
| 18 | 0.20 | NP | walk to/from tools | |
| 19 | 0.05 | IP | select tools | |
| 20 | 0.25 | NP | walk to/from tools | |
| 21 | 23.00 | P | repair | |
| 22 | 1.60 | NP | walk to parts inventory | |
| 23 | 2.35 | P | obtain parts | couldn't find part |
| 24 | 0.80 | NP | look for a similar part | |
| 25 | 0.40 | NP | walk from parts inventory | |
| 26 | 2.00 | P | repair | |
| 27 | 1.00 | NP | give assistance | |
| 28 | 7.70 | P | repair | |
| 29 | 0.30 | NP | walk to/from tools | |

*P = Productive.

NP = Nonproductive.

IP = Indirect productive.

Table C2 (Cont'd)

| Sequence No. | Time | Category* | Description | Comments |
|-----------------|-------|-----------|---------------------------------|----------|
| 30 | 0.10 | IP | select tools | |
| 31 | 0.35 | NP | walk to/from tools | |
| 32 | 17.50 | P | repair | |
| 33 | 1.30 | NP | clean hands | |
| 34 | 15.80 | NP | coffee break | |
| 35 | 11.00 | P | repair | |
| 36 | 0.45 | NP | walk to parts inventory | |
| 37 | 4.70 | NP | talk to inventory control clerk | |
| 38 | 0.45 | NP | walk from parts inventory | |
| 39 | 29.80 | P | repair | |
| 40 | 0.20 | NP | walk to/from tools | |
| 41 | 0.10 | IP | select tools | |
| 42 | 0.20 | NP | walk to/from tools | |
| 43 | 3.50 | P | repair | |
| 44 | 0.35 | NP | walk to/from tools | |
| 45 | 0.25 | IP | select tools | |
| 46 | 0.40 | NP | walk to/from tools | |
| 47 | 11.50 | P | repair | |
| 48 | 4.50 | IP | clean work area | |
| 49 | 0.50 | NP | complete LE form | |
| 50 | 2.45 | NP | clean hands | |

END OF DAY

*P = Productive.

NP = Nonproductive.

IP = Indirect productive.

APPENDIX D: TASK DESCRIPTION OF 10 VEHICLES WITH THE HIGHEST NUMBER OF REPAIR TASKS PERFORMED

| FE# | DOC # | DESCRIPTION | FE# | DOC # | DESCRIPTION |
|-------|--------|-------------------------------|-------|--------|---------------------------------|
| ***** | ***** | ***** | ***** | ***** | ***** |
| 2 | 0316-6 | M Maint | 2 | 1904-6 | Adjust ball joint linkage |
| 2 | 0316-6 | M-Maint | 2 | 1904-6 | Replace ball joint |
| 2 | 0316-6 | Repair mirror | 2 | 1904-6 | Rpl ball joint |
| 2 | 0316-6 | Replace brake lite bulbs | 2 | 1919-6 | Replace tire |
| 2 | 0316-6 | Replace defroster | 2 | 1919-6 | Rpl tire |
| 2 | 0316-6 | Replace fan belts | 2 | 2518-6 | M Maint |
| 2 | 0316-6 | Replace fuel sender switch | 2 | 2518-6 | M-Maint |
| 2 | 0366-6 | Bleed brakes | 2 | 2518-6 | Replace tire |
| 2 | 0366-6 | Repair brake line | 2 | 2883-6 | Q-Maint |
| 2 | 0366-6 | Service Call | 2 | 2883-6 | Q-Maint |
| 2 | 0366-6 | Service call | 2 | 2967-6 | Replace rim assembly |
| 2 | 0536-6 | Checked u joints | 2 | 2967-6 | Rpl rim assembly |
| 2 | 0536-6 | M Maint | 2 | 3117-6 | Repair level control |
| 2 | 0536-6 | M-Maint | 2 | 3117-6 | Rpr level control |
| 2 | 0536-6 | Repair starter wire | 2 | 3242-6 | M Maint |
| 2 | 0623-6 | Repair air system | 2 | 3242-6 | M-Maint |
| 2 | 0623-6 | Rpr air system | 2 | 3242-6 | Repair transmisson rear output |
| 2 | 0641-6 | Drain water in tank | 2 | 3242-6 | Replace air cleaner |
| 2 | 0641-6 | Service Call | 2 | 3242-6 | Replace cushion assembly |
| 2 | 0641-6 | Service call | 2 | 3242-6 | Replace engine coolant |
| 2 | 0641-6 | Service treddle valve | 2 | 3242-6 | Replace engine oil |
| 2 | 0721-6 | Repair tire | 2 | 3242-6 | Replace engine oil filter |
| 2 | 0721-6 | Service Call | 2 | 3242-6 | Replace fuel filter |
| 2 | 0721-6 | Service call | 2 | 3242-6 | Replace fuel filters |
| 2 | 0760-6 | Repair door lock | 2 | 3242-6 | Replace hydraulic oil |
| 2 | 0760-6 | Rpr Door Lock | 2 | 3242-6 | Replace spider bearing assembly |
| 2 | 0768-6 | Adjust bucket levelers | 2 | 3242-6 | Replace tooth tip |
| 2 | 0768-6 | Check for hydraulic leaks | 2 | 3874-6 | Repair tire |
| 2 | 0768-6 | Repair wiring on brake lights | 2 | 3874-6 | Service Call |
| 2 | 0768-6 | Repair wiring on tail lights | 2 | 3874-6 | Service call |
| 2 | 0768-6 | Replace bulbs | 2 | 9999-9 | Repair lift lever |
| 2 | 0768-6 | Rpr wiring | 2 | 9999-9 | Rpr lift lever |
| 2 | 0876-6 | Checked for hydraulic leaks | 9 | 0061-6 | Q-Maint |
| 2 | 0876-6 | Q-Maint | 9 | 0061-6 | Q-Maint |
| 2 | 0876-6 | Q-Maint | 9 | 0061-6 | Replace master cylinder |
| 2 | 1010-6 | Bleed brakes | 9 | 0093-6 | Adjust left and right chain |
| 2 | 1010-6 | Bleed brakes | 9 | 0093-6 | Repair drive chain left side |
| 2 | 1010-6 | Remove and install bleeders | 9 | 0093-6 | Replace link |
| 2 | 1010-6 | Repair brakes | 9 | 0093-6 | Service Call |
| 2 | 1062-6 | M Maint | 9 | 0093-6 | Service call |
| 2 | 1062-6 | M-Maint | 9 | 0312-6 | Replace tire 700x15 |
| 2 | 1062-6 | Repair hydraulic hose | 9 | 0312-6 | Replace tube |
| 2 | 1062-6 | Replace bucket edge | 9 | 0312-6 | Rpl tire |
| 2 | 1062-6 | Replace bulb | 9 | 0460-6 | Repair flasher unit |
| 2 | 1062-6 | Replace dipstick | 9 | 0460-6 | Replace 3 prong switch |
| 2 | 1062-6 | Replace headlight | 9 | 0460-6 | Replace flasher |
| 2 | 1062-6 | Replace headlight arrangement | 9 | 0460-6 | Replace wiring |
| 2 | 1062-6 | Replace teeth | 9 | 0460-6 | Rpr flasher unit |
| 2 | 1062-6 | Replace teeth pin | 9 | 0656-6 | Adjust points and carburetor |
| 2 | 1062-6 | Replace tire | 9 | 0656-6 | Bleed brake system |
| 2 | 1062-6 | Replace washers | 9 | 0656-6 | Checked electrical wiring |
| 2 | 1399-6 | Bleed brakes | 9 | 0656-6 | Cleaned inside of engine compar |
| 2 | 1399-6 | M Maint | 9 | 0656-6 | Fixed wires on brake cylinders |
| 2 | 1399-6 | M-Maint | 9 | 0656-6 | Replace belt water pump |
| 2 | 1399-6 | Repair air line | 9 | 0656-6 | Replace chain main broom drive |
| 2 | 1399-6 | Replace brake cylinder group | 9 | 0656-6 | Replace chain main drive |
| 2 | 1399-6 | Replace bucket pivot pins | 9 | 0656-6 | Replace engine oil filter |
| 2 | 1399-6 | Replace tail light assembly | 9 | 0656-6 | Replace hydraulic filter |
| 2 | 1399-6 | Replace tire | 9 | 0656-6 | Replace main broom wafers |
| 2 | 1399-6 | Steam clean vehicle | 9 | 0656-6 | Replace seal quad |
| 2 | 1626-6 | Repair tire | 9 | 0656-6 | Replace sprocket bushing |
| 2 | 1626-6 | Replace valve stem | 9 | 0656-6 | Replace sprocket drive wheel |
| 2 | 1626-6 | Rpr tire | 9 | 0656-6 | Replace sprocket front drive |
| 2 | 1684-6 | Clean plug | 9 | 0656-6 | Rpr points/carburetor |
| 2 | 1684-6 | Weld bucket | 9 | 0656-6 | weld main broom lug |
| 2 | 1702-6 | Install registration numbers | 9 | 0912-6 | Adjust brake |
| 2 | 1702-6 | Q-Maint | 9 | 0912-6 | Adjust brake hydrovac |
| 2 | 1702-6 | Q-Maint | 9 | 1035-6 | Adjust hydraulic controls |
| 2 | 1702-6 | Repair rear glass frame | 9 | 1035-6 | Q-Maint |
| 2 | 1702-6 | Replace brake lite switch | 9 | 1035-6 | Q-Maint |
| 2 | 1702-6 | Replace door glass | 9 | 1035-6 | Replace hydraulic hose fittings |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------|
| 9 | 1035-6 | Replace hydraulic hose |
| 9 | 1035-6 | Replace hydraulic oil |
| 9 | 1035-6 | Replace hydrovac cylinder(wanna |
| 9 | 1035-6 | Replace points |
| 9 | 1035-6 | Replace side broom |
| 9 | 1239-6 | Repair detent assembly |
| 9 | 1239-6 | Replace caution sign |
| 9 | 1239-6 | Replace left and right door gla |
| 9 | 1239-6 | Rpr detent assembly |
| 9 | 1542-6 | Repair stabilizer bar |
| 9 | 1542-6 | Repair tire |
| 9 | 1542-6 | Replace wiper motor |
| 9 | 1542-6 | Rpr tire |
| 9 | 1575-6 | Adjust clutch return spring |
| 9 | 1575-6 | Realign brake |
| 9 | 1575-6 | Realigned brake |
| 9 | 1575-6 | Repair stabilizer |
| 9 | 1575-6 | Replace clutch master cylinder |
| 9 | 1575-6 | Replace clutch slave cylinder |
| 9 | 1718-6 | Replace side broom |
| 9 | 1718-6 | Service Call |
| 9 | 1822-6 | Adjust dirt shoe |
| 9 | 1822-6 | Repair side broom guide |
| 9 | 1822-6 | Replace 700x15HT tire |
| 9 | 1822-6 | Replace main broom |
| 9 | 1822-6 | Replace shoe runner front |
| 9 | 1822-6 | Replace shoe runner rear |
| 9 | 1822-6 | Replace side broom |
| 9 | 1822-6 | Weld side broom bolt |
| 9 | 1867-6 | Adjust slave cylinder linkage |
| 9 | 1867-6 | Repair slave cylinder bracket |
| 9 | 1867-6 | Replace slave cylinder |
| 9 | 1867-6 | Rpl fuel pump |
| 9 | 1899-6 | Bleed brakes |
| 9 | 1899-6 | Install left rearview mirror |
| 9 | 1899-6 | Lubricate vehicle |
| 9 | 1899-6 | Repair steering |
| 9 | 1899-6 | Repair turn signal lever |
| 9 | 1899-6 | Repair wiring |
| 9 | 1899-6 | Replace brake fluid |
| 9 | 1899-6 | Replace engine oil |
| 9 | 1899-6 | Replace engine oil filter |
| 9 | 1899-6 | Replace indicator bulb |
| 9 | 1899-6 | Replace intake gasket |
| 9 | 1899-6 | Replace push rod gasket |
| 9 | 1982-6 | Replace main broom drum |
| 9 | 1982-6 | Replace main broom side shaft b |
| 9 | 1982-6 | Rpl main broom |
| 9 | 2222-6 | Replace bolt and bushings side |
| 9 | 2222-6 | Replace clutch disc assembly |
| 9 | 2222-6 | Replace emergency brake band |
| 9 | 2222-6 | Replace engine oil filter |
| 9 | 2222-6 | Replace engine thermostat |
| 9 | 2222-6 | Replace hydraulic filter |
| 9 | 2222-6 | Replace oil pan gasket |
| 9 | 2222-6 | Replace pilot bearing fly wheel |
| 9 | 2222-6 | Replace pivot gear housing uppe |
| 9 | 2222-6 | Replace pivot shaft bearing sid |
| 9 | 2222-6 | Replace pressure plate |
| 9 | 2222-6 | Replace seal |
| 9 | 2222-6 | Replace seal side broom |
| 9 | 2222-6 | Replace seals side broom gear b |
| 9 | 2222-6 | Replace shaft upper side broom |
| 9 | 2222-6 | Replace side broom bolt |
| 9 | 2222-6 | Replace side broom bottom shaft |
| 9 | 2222-6 | Replace side broom drive shaft |
| 9 | 2222-6 | Replace side broom intermediate |
| 9 | 2222-6 | Replace side broom rack |
| 9 | 2222-6 | Replace side broom sprocket |
| 9 | 2222-6 | Replace sleeve assy throw out b |
| 9 | 2222-6 | Replace tire 600x15 |

| FE# | DOC # | DESCRIPTION |
|-----|--------|----------------------------------|
| 9 | 2222-6 | Replace universal coupling |
| 9 | 2222-6 | Replace wheel |
| 9 | 2222-6 | Rpl wheel |
| 9 | 2704-6 | Q-Maint |
| 9 | 2704-6 | Q-Maint |
| 9 | 2704-6 | Replace condensor |
| 9 | 2704-6 | Replace plugs |
| 9 | 2704-6 | Replace points |
| 9 | 2704-6 | Replace side broom |
| 9 | 3104-6 | Adjust side and main broom chai |
| 9 | 3104-6 | Adjust side broom cable |
| 9 | 3104-6 | Replace clearance lite markers |
| 9 | 3104-6 | Replace headlight |
| 9 | 3104-6 | Replace left hand rubber shoes |
| 9 | 3104-6 | Replace left hand shoe assembly |
| 9 | 3104-6 | Replace left hand rubber brg sto |
| 9 | 3104-6 | Replace main broom |
| 9 | 3104-6 | Replace signal flasher |
| 9 | 3104-6 | Replace stop lite switch |
| 9 | 3104-6 | Replace switch assembly |
| 9 | 3104-6 | Replace tail and stop lite asse |
| 9 | 3104-6 | Replace turn signal switch asse |
| 9 | 3104-6 | Rpl main broom |
| 9 | 3224-6 | Replace runner shoes |
| 9 | 3224-6 | Replace side broom |
| 9 | 3224-6 | Rpl runner shoes |
| 9 | 3460-6 | Repair wiper motor aim |
| 9 | 3651-6 | Repair tire |
| 9 | 3651-6 | Rpr tire |
| 9 | 3685-6 | Repair rear tires |
| 9 | 3685-6 | Replace main broom |
| 9 | 3685-6 | Replace rear tire |
| 9 | 3685-6 | Replace rear wheel 15" |
| 9 | 3685-6 | Replace side broom |
| 9 | 3685-6 | Replace tube |
| 9 | 3685-6 | Rpr tires |
| 10 | 0095-6 | Repair tire |
| 10 | 0095-6 | Repair tube 700x15 |
| 10 | 0095-6 | Rpr Tire |
| 10 | 0116-6 | Replace headlight |
| 10 | 0116-6 | Replace main broom |
| 10 | 0116-6 | Replace main broom drive sprock |
| 10 | 0116-6 | Replace main broom rear sprocke |
| 10 | 0116-6 | Replace runner dirt shoe |
| 10 | 0116-6 | Replace signal flasher |
| 10 | 0116-6 | Rpl main broom |
| 10 | 0477-6 | Q-Maint |
| 10 | 0477-6 | Q-Maint |
| 10 | 0477-6 | Replace clearance lights |
| 10 | 0477-6 | Replace emergency brake band |
| 10 | 0477-6 | Replace emergency brake drum |
| 10 | 0477-6 | Replace exhaust manifold gasket |
| 10 | 0477-6 | Replace master cylinder clutch |
| 10 | 0647-6 | Replace headlight |
| 10 | 0647-6 | Rpl headlight |
| 10 | 0668-6 | Q-Maint |
| 10 | 0668-6 | Q-Maint |
| 10 | 0668-6 | Repair and reseal broom transfe |
| 10 | 0668-6 | Repair side window channels |
| 10 | 0668-6 | Replace main broom drive chain |
| 10 | 0668-6 | Replace main broom drive sprock |
| 10 | 0668-6 | Replace side broom drive sprock |
| 10 | 1147-6 | Weld water tank |
| 10 | 1147-6 | Weld water tank |
| 10 | 1153-6 | Replace hour meter |
| 10 | 1153-6 | Rpl hour meter |
| 10 | 1189-6 | Replace side broom |
| 10 | 1189-6 | Rpl side broom |
| 10 | 1249-6 | Repair cam arm main broom |
| 10 | 1249-6 | Repair dirt guard |
| 10 | 1249-6 | Replace main broom |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------|
| 10 | 1249-6 | Replace main broom core |
| 10 | 1249-6 | Rpr cam arm |
| 10 | 1450-6 | Adjust clutch |
| 10 | 1450-6 | Adjust steering |
| 10 | 1450-6 | Install sheet metal |
| 10 | 1450-6 | Q-Maint |
| 10 | 1450-6 | Q-Maint |
| 10 | 1450-6 | Repair tire |
| 10 | 1450-6 | Replace clutch disk |
| 10 | 1450-6 | Replace drive chain side broom |
| 10 | 1450-6 | Replace drive sprocket |
| 10 | 1450-6 | Replace main broom drive chain |
| 10 | 1450-6 | Replace main broom drive shaft |
| 10 | 1450-6 | Replace main broom drive sprock |
| 10 | 1450-6 | Replace pilot bearing |
| 10 | 1450-6 | Replace pressure plate |
| 10 | 1450-6 | Replace PTO assembly |
| 10 | 1450-6 | Replace side broom drive sprock |
| 10 | 1450-6 | Replace throw out bearing |
| 10 | 1450-6 | Replace thrust washer side broo |
| 10 | 1450-6 | Replace transmisson |
| 10 | 1450-6 | Steam clean vehicle |
| 10 | 1544-6 | Repair tire |
| 10 | 1544-6 | Rpr tire |
| 10 | 2340-6 | Repair beacon light |
| 10 | 2340-6 | Replace side broom shear pin |
| 10 | 2340-6 | Rpr beacon light |
| 10 | 2705-6 | Replace condensor |
| 10 | 2705-6 | Replace ignition points |
| 10 | 2705-6 | Replace main broom |
| 10 | 2705-6 | Replace plugs |
| 10 | 2705-6 | Rpl points & plugs |
| 10 | 2941-6 | Adjust carb |
| 10 | 2941-6 | Q-Maint |
| 10 | 2941-6 | Q-Maint |
| 10 | 2941-6 | Replace bulb |
| 10 | 2941-6 | Replace carburetor |
| 10 | 2941-6 | Replace drive chain side broom |
| 10 | 2941-6 | Replace main broom |
| 10 | 2941-6 | Replace main broom drive chain |
| 10 | 2941-6 | Replace main broom shaft bearin |
| 10 | 2941-6 | Replace runner dirt shoe |
| 10 | 2941-6 | Replace side broom |
| 10 | 2941-6 | Replace side broom gear |
| 10 | 2941-6 | Replace transfer gear box oil |
| 10 | 2941-6 | Replace transfer gear box seal |
| 10 | 3384-6 | Adjust emerg brake |
| 10 | 3384-6 | Adjust emergency brake |
| 10 | 3384-6 | Replace alternator |
| 10 | 3384-6 | Replace hydraulic hoses |
| 10 | 3384-6 | Replace hydraulic oil |
| 10 | 3384-6 | Replace side broom |
| 10 | 3384-6 | Steam clean vehicle |
| 10 | 3660-6 | Repair rear tires |
| 10 | 3660-6 | Replace gear box oil |
| 10 | 3660-6 | Replace hydraulic pump |
| 10 | 3660-6 | Replace rear tire |
| 10 | 3660-6 | Replace rear wheel |
| 10 | 3660-6 | Replace side broom |
| 10 | 3660-6 | Replace side broom seals |
| 10 | 3660-6 | Replace side broom shaft lower |
| 10 | 3660-6 | Replace side broom shaft upper |
| 10 | 3660-6 | Replace side broom u-joint |
| 10 | 3660-6 | Replace side clearance lens |
| 10 | 3660-6 | Replace tube |
| 10 | 3660-6 | Replace woodruff key size G |
| 10 | 3660-6 | Rpr tire/wheel |
| 10 | 3740-6 | Repair tire |
| 10 | 3740-6 | Rpr tire |
| 15 | 0172-6 | Repair track |
| 15 | 0172-6 | Service Call |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------|
| 15 | 0172-6 | Service call |
| 15 | 0378-6 | Repair starter solenoid wire |
| 15 | 0378-6 | Service Call |
| 15 | 0378-6 | Service call |
| 15 | 0463-6 | Replace tilt cylinder hose on b |
| 15 | 0463-6 | Rpl tilt cyl |
| 15 | 0775-6 | Service Call |
| 15 | 0775-6 | Service call |
| 15 | 0880-6 | Adjust brakes |
| 15 | 0880-6 | Q-Maint |
| 15 | 0880-6 | Q-Maint |
| 15 | 0880-6 | Replace end bits |
| 15 | 0880-6 | Rotate cutting edges |
| 15 | 0913-6 | Adjust arm |
| 15 | 0913-6 | Adjust arm |
| 15 | 0913-6 | Remove and install dozer arm |
| 15 | 0913-6 | Replace bits |
| 15 | 0913-6 | Weld dozer arm |
| 15 | 1068-6 | Replace transmisson oil |
| 15 | 1068-6 | Replace transmisson oil filter |
| 15 | 1068-6 | Service Call |
| 15 | 1068-6 | Service call |
| 15 | 1411-6 | Service Call |
| 15 | 1411-6 | Service call |
| 15 | 1430-6 | Replace hose and fittings |
| 15 | 1430-6 | Rpl hose |
| 15 | 1494-6 | Adjust all belts |
| 15 | 1494-6 | Service Call |
| 15 | 1494-6 | Service call |
| 15 | 1607-6 | Adjust center arm |
| 15 | 1607-6 | Adjust dozer arm pins |
| 15 | 1607-6 | Adjust dozer arm shims |
| 15 | 1607-6 | Install dozer arm caps |
| 15 | 1607-6 | Repair lock bolts and brackets |
| 15 | 1607-6 | Replace bolts |
| 15 | 1607-6 | Rpl bolt |
| 15 | 1607-6 | Service call |
| 15 | 1710-6 | Adjust brakes |
| 15 | 1710-6 | Q-Maint |
| 15 | 1710-6 | Q-Maint |
| 15 | 1710-6 | Repair rock guards |
| 15 | 1710-6 | Replace hydraulic hose tilt |
| 15 | 1710-6 | Replace hydraulic lift cylinder |
| 15 | 1710-6 | Service call |
| 15 | 1750-6 | Adjust brakes |
| 15 | 1750-6 | Service Call |
| 15 | 1750-6 | Service call |
| 15 | 2078-6 | Repair wire |
| 15 | 2078-6 | Service Call |
| 15 | 2078-6 | Service call |
| 15 | 2329-6 | Q-Maint |
| 15 | 2329-6 | Replace left dozer bit |
| 15 | 2329-6 | Replace lift cylinder pivot bea |
| 15 | 2379-6 | Adjust steering linkage |
| 15 | 2379-6 | Adjust steering linkage |
| 15 | 2379-6 | Check charging system |
| 15 | 2379-6 | Replace pin |
| 15 | 2379-6 | Replace roller bearing |
| 15 | 2379-6 | Service call |
| 15 | 2449-6 | Realign rear broom |
| 15 | 2449-6 | Replace O-ring packing preforme |
| 15 | 2449-6 | Replace transmisson fluid |
| 15 | 2449-6 | Replace transmisson hose |
| 15 | 2449-6 | Service call |
| 15 | 2501-6 | Repair fuel line |
| 15 | 2501-6 | Service call |
| 15 | 2501-6 | S-Maint |
| 15 | 2585-5 | Replace plug |
| 15 | 2585-5 | Rpl plug |
| 15 | 2586-6 | Q-Maint |
| 15 | 2586-6 | Q-Maint |

| FE# | DOC # | DESCRIPTION |
|-----|--------|----------------------------------|
| 15 | 2586-6 | Reinstall cylinder heads (rebuil |
| 15 | 2586-6 | Remove and install belly pan |
| 15 | 2586-6 | Remove and install radiator fan |
| 15 | 2586-6 | Remove, clean and install radia |
| 15 | 2586-6 | Replace 4-1/2" tubing |
| 15 | 2586-6 | Replace bridge clamp |
| 15 | 2586-6 | Replace cap air cleaner |
| 15 | 2586-6 | Replace clamp |
| 15 | 2586-6 | Replace coupling |
| 15 | 2586-6 | Replace cover bearing |
| 15 | 2586-6 | Replace cylinder head gaskets |
| 15 | 2586-6 | Replace element breather |
| 15 | 2586-6 | Replace exhaust stud to head |
| 15 | 2586-6 | Replace ferrule grooved |
| 15 | 2586-6 | Replace fuel pressure gage |
| 15 | 2586-6 | Replace gasket |
| 15 | 2586-6 | Replace gasket exhaust manifold |
| 15 | 2586-6 | Replace gasket intake manifold |
| 15 | 2586-6 | Replace line assembly |
| 15 | 2586-6 | Replace locking plate |
| 15 | 2586-6 | Replace magnet |
| 15 | 2586-6 | Replace O-ring |
| 15 | 2586-6 | Replace packing preformed |
| 15 | 2586-6 | Replace pump oil transmission |
| 15 | 2586-6 | Replace push rod gasket complet |
| 15 | 2586-6 | Replace screen |
| 15 | 2586-6 | Replace seal |
| 15 | 2586-6 | Replace seal plain encased |
| 15 | 2586-6 | Replace seal ring metal |
| 15 | 2586-6 | Replace strainer assembly |
| 15 | 2586-6 | Replace thermostat |
| 15 | 2586-6 | Replace tube clamp |
| 15 | 2586-6 | Replace turbo charger assembly |
| 15 | 2586-6 | Replace valve check |
| 15 | 2586-6 | Replace water distributor ferru |
| 15 | 2586-6 | Replace water distributor gaske |
| 15 | 2586-6 | Steam clean vehicle |
| 15 | 2586-6 | Welding on tractor |
| 15 | 2879-6 | Installed hydraulic lines for d |
| 15 | 2879-6 | Inst/Rpl hydraulic lines |
| 15 | 2879-6 | Remove & install frt grill, flo |
| 15 | 2879-6 | Remove & install hood, exh stk, |
| 15 | 2879-6 | Replace alternator belt |
| 15 | 2879-6 | Replace hydraulic oil |
| 15 | 2889-6 | Adjust fan belts |
| 15 | 2889-6 | Adjust tracks |
| 15 | 2889-6 | Install hyd lines for disconnec |
| 15 | 2889-6 | Install hydraulic quick disconn |
| 15 | 2889-6 | Plug hydraulic hose tilt |
| 15 | 2889-6 | Q-Maint |
| 15 | 2889-6 | Q-Maint |
| 15 | 2889-6 | Repair breather stack |
| 15 | 2889-6 | Repair door to track adj zert |
| 15 | 2889-6 | Repair exhaust elbow and flange |
| 15 | 2889-6 | Replace alternator belt |
| 15 | 2889-6 | Replace winch cable |
| 15 | 2889-6 | Replace winch oil |
| 15 | 2889-6 | Weld hand rail |
| 15 | 2889-6 | Welded dirt guard brackets |
| 15 | 2910-6 | Repair headache rack (weld) |
| 15 | 2910-6 | Replace oil switch |
| 15 | 2910-6 | Replace winch control cable |
| 15 | 2910-6 | Service Call |
| 15 | 2910-6 | Service call |
| 15 | 3565-6 | Replace hose |
| 15 | 3565-6 | Service Call |
| 15 | 3565-6 | Service call |
| 15 | 3565-6 | Repair fuel line |
| 15 | 3565-6 | Service Call |
| 15 | 3565-6 | Service call |
| 18 | 1048-6 | Replace main broom |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------|
| 18 | 1048-6 | Rpl main broom |
| 18 | 1188-6 | Repair indicator cable |
| 18 | 1188-6 | Rpr ind cable |
| 18 | 1230-6 | Install hour meter |
| 18 | 1230-6 | Instl hour meter |
| 18 | 1230-6 | Repair alternator wiring |
| 18 | 1230-6 | Repl ce alternator |
| 18 | 1230-6 | Repl:ce spark plug |
| 18 | 1340-6 | Adjust conveyor belt |
| 18 | 1340-6 | Adjust conveyor belt bearings |
| 18 | 1340-6 | Replace battery |
| 18 | 1340-6 | Replace distributor cap |
| 18 | 1340-6 | Troubleshoot generator system |
| 18 | 1441-6 | Adjust clutch |
| 18 | 1441-6 | Adjust clutch |
| 18 | 1441-6 | Realign rear broom chain |
| 18 | 1441-6 | Reconnect alternator leads |
| 18 | 1441-6 | Repair side broom chain |
| 18 | 1441-6 | Replace side broom shear pin |
| 18 | 1501-6 | Replace tube |
| 18 | 1501-6 | Rpl tube |
| 18 | 1535-6 | Repair tire |
| 18 | 1535-6 | Rpr tire |
| 18 | 1576-6 | Checked hydraulics |
| 18 | 1576-6 | Checked hydraulics |
| 18 | 1576-6 | Replace chain drive belt |
| 18 | 1576-6 | Replace hydraulic filter |
| 18 | 1593-6 | Lubricate |
| 18 | 1593-6 | Repair clutch |
| 18 | 1593-6 | Replace hydraulic hose |
| 18 | 1593-6 | Replace slave bracket |
| 18 | 1593-6 | Weld pressure plate |
| 18 | 1648-6 | Bleed injectors |
| 18 | 1648-6 | Repair side broom guides |
| 18 | 1648-6 | Weld side broom guide pin |
| 18 | 1839-6 | Adjust dirt shoe |
| 18 | 1839-6 | Repair dirt shoe |
| 18 | 1839-6 | Repair guide bracket bolt |
| 18 | 1839-6 | Replace bolts in dirt shoe brac |
| 18 | 1839-6 | Rpl pivot pin |
| 18 | 2010-6 | Adjust clutch |
| 18 | 2010-6 | Adjust steering |
| 18 | 2010-6 | Align side broom |
| 18 | 2010-6 | Q-Maint |
| 18 | 2010-6 | Replace electrical terminals |
| 18 | 2010-6 | Replace head light seal beam |
| 18 | 2010-6 | Replace main drive chain |
| 18 | 2010-6 | Replace main drive sprockets |
| 18 | 2010-6 | Replace side light seal beam |
| 18 | 2010-6 | Replace turn signal assembly |
| 18 | 2242-6 | Repair tire |
| 18 | 2242-6 | Rpr tire |
| 18 | 2300-6 | Align side broom |
| 18 | 2300-6 | Align side broom rails |
| 18 | 2300-6 | Replace antifreeze |
| 18 | 2300-6 | Replace condensor |
| 18 | 2300-6 | Replace conveyor belt |
| 18 | 2300-6 | Replace distributor point set |
| 18 | 2300-6 | Replace lower conveyor roller b |
| 18 | 2300-6 | Replace spark plug |
| 18 | 2300-6 | Weld side broom guides |
| 18 | 2312-6 | Adjust emergency brake |
| 18 | 2312-6 | Adjust emergency brake |
| 18 | 2312-6 | Adjust steering linkage |
| 18 | 2428-6 | Engine compression test |
| 18 | 2428-6 | Realign rear broom |
| 18 | 2428-6 | Remove and install side broom g |
| 18 | 2428-6 | Replace engine oil |
| 18 | 2428-6 | Replace engine oil filter |
| 18 | 2428-6 | Renlace seal beam |
| 18 | 2428-6 | Repl:ce side broom coupling u-j |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------------|
| 18 | 2428-6 | Replace spark plug |
| 18 | 2428-6 | Service Call |
| 18 | 2428-6 | Weld side cylinder pin |
| 18 | 2666-6 | Adjust engine timing |
| 18 | 2666-6 | Replace copper fuel hose |
| 18 | 2666-6 | Replace electrical connectors |
| 18 | 2666-6 | Replace engine oil |
| 18 | 2666-6 | Replace engine oil filter |
| 18 | 2666-6 | Replace fuel pump |
| 18 | 2666-6 | Replace hose clamps |
| 18 | 2666-6 | Replace inline fuel filter |
| 18 | 2666-6 | Replace main broom |
| 18 | 2666-6 | Replace side broom chain |
| 18 | 2666-6 | Replace spark plug |
| 18 | 2666-6 | Rpr Engine |
| 18 | 3126-5 | Install 1/4 flatwashers |
| 18 | 3126-5 | Install 1/4 hex nuts |
| 18 | 3126-5 | Install 1/4 lockwashers |
| 18 | 3126-5 | Install 1/4x1/2 cap screws |
| 18 | 3126-5 | Install conveyer belt |
| 18 | 3126-5 | Install main broom |
| 18 | 3126-5 | Q-Maint |
| 18 | 3126-5 | Q-Maint |
| 18 | 3126-5 | Repair light system |
| 18 | 3126-5 | Repair point system |
| 18 | 3126-5 | Replace alternator |
| 18 | 3126-5 | Replace battery |
| 18 | 3126-5 | Replace cap screw |
| 18 | 3126-5 | Replace convertor deflector left |
| 18 | 3126-5 | Replace convertor deflector right |
| 18 | 3126-5 | Replace dirt shoe extension spring |
| 18 | 3126-5 | Replace external side broom rim |
| 18 | 3126-5 | Replace flange bearing over roller |
| 18 | 3126-5 | Replace flasher |
| 18 | 3126-5 | Replace fuel pump |
| 18 | 3126-5 | Replace jack shaft side broom rim |
| 18 | 3126-5 | Replace master cylinder brake |
| 18 | 3126-5 | Replace master cylinder clutch |
| 18 | 3126-5 | Replace pivot gear housing side broom |
| 18 | 3126-5 | Replace pivot housing side broom |
| 18 | 3126-5 | Replace pivot housing side broom |
| 18 | 3126-5 | Replace seal |
| 18 | 3126-5 | Replace seal input shaft |
| 18 | 3126-5 | Replace side broom chain sprocket |
| 18 | 3126-5 | Replace side broom pivot housing |
| 18 | 3126-5 | Replace side broom seal |
| 18 | 3126-5 | Replace side broom spring |
| 18 | 3126-5 | Replace side lights |
| 18 | 3126-5 | Replace signal flasher |
| 18 | 3126-5 | Replace sprocket side broom drive |
| 18 | 3126-5 | Replace turn signal assembly |
| 18 | 3126-5 | Replace wafer core |
| 18 | 3126-5 | Replace wiper clamp |
| 18 | 3126-5 | Replace wiper convertor deflector |
| 18 | 3126-5 | Weld hopper door brace |
| 18 | 3409-6 | Replace fittings |
| 18 | 3409-6 | Replace hydraulic hose |
| 18 | 3409-6 | Replace fittings/hose |
| 18 | 3409-6 | Steam clean |
| 18 | 3673-6 | Repair tire |
| 18 | 3673-6 | Rpr tire |
| 365 | 0336-6 | L Maint |
| 365 | 0336-6 | L Maint |
| 365 | 0336-6 | L Maint |
| 365 | 0336-6 | Repair air tank |
| 365 | 0336-6 | Repair air tank |
| 365 | 0336-6 | Repair horn button |
| 365 | 0336-6 | Repair horn button |
| 365 | 0336-6 | Repair idler arm |
| 365 | 0336-6 | Repair idler arm |
| 365 | 0336-6 | Replace adapter alcohol bottle |

| FE# | DOC # | DESCRIPTION |
|-----|--------|--------------------------------|
| 365 | 0336-6 | Replace adapter alcohol bottle |
| 365 | 0336-6 | Replace air comp base gasket |
| 365 | 0336-6 | Replace air comp base gasket |
| 365 | 0336-6 | Replace alternator |
| 365 | 0336-6 | Replace alternator |
| 365 | 0336-6 | Replace clutch |
| 365 | 0336-6 | Replace clutch |
| 365 | 0336-6 | Replace defroster hose |
| 365 | 0336-6 | Replace defroster hose |
| 365 | 0336-6 | Replace fan belt |
| 365 | 0336-6 | Replace fan belt |
| 365 | 0336-6 | Replace flasher |
| 365 | 0336-6 | Replace flasher |
| 365 | 0336-6 | Replace injector |
| 365 | 0336-6 | Replace injector |
| 365 | 0336-6 | Replace oil line |
| 365 | 0336-6 | Replace oil line |
| 365 | 0336-6 | Replace oil switch |
| 365 | 0336-6 | Replace oil switch |
| 365 | 0336-6 | Replace transmission oil |
| 365 | 0336-6 | Replace transmission oil |
| 365 | 0764-6 | Adjust tailgate clamps |
| 365 | 0764-6 | Adjust tailgate clamps |
| 365 | 0764-6 | Repair tailgate chains |
| 365 | 0764-6 | Repair tailgate chains |
| 365 | 0764-6 | Rpr Tailgate Chains |
| 365 | 0788-6 | Replace batteries |
| 365 | 0788-6 | Replace batteries |
| 365 | 0788-6 | Service Call |
| 365 | 0788-6 | Service call |
| 365 | 0788-6 | Service call |
| 365 | 0839-6 | Charge Batteries |
| 365 | 0839-6 | Charge batteries |
| 365 | 0839-6 | Charge batteries |
| 365 | 0885-6 | Repair tire |
| 365 | 0885-6 | Repair tire |
| 365 | 0885-6 | Rpr Tire |
| 365 | 0897-6 | Weld Headache Rack |
| 365 | 0897-6 | Weld headache rack |
| 365 | 0897-6 | Weld headache rack |
| 365 | 0910-6 | Repair power steering hose |
| 365 | 0910-6 | Repair power steering hose |
| 365 | 0910-6 | Replace steering fluid |
| 365 | 0910-6 | Replace steering fluid |
| 365 | 0910-6 | Rpr PS Hose |
| 365 | 0920-6 | Repair wheel (loose) |
| 365 | 0920-6 | Repair wheel (loose) |
| 365 | 0920-6 | Replace tire |
| 365 | 0920-6 | Replace tire |
| 365 | 0920-6 | Rpr Wheel |
| 365 | 0920-6 | Weld chain holder |
| 365 | 0920-6 | Weld chain holder |
| 365 | 0920-6 | Weld tailgate |
| 365 | 0920-6 | Weld tailgate |
| 365 | 0935-6 | Charge Battery |
| 365 | 0935-6 | Charge battery |
| 365 | 0935-6 | Charge battery |
| 365 | 0935-6 | Start truck |
| 365 | 0935-6 | Start truck |
| 365 | 1040-6 | Repair tire |
| 365 | 1040-6 | Repair tire |
| 365 | 1040-6 | Rpr Tire |
| 365 | 1044-6 | Repair/align tailgate |
| 365 | 1044-6 | Repair/align tailgate |
| 365 | 1044-6 | Replace bulb |
| 365 | 1044-6 | Replace bulb |
| 365 | 1044-6 | Rpr/Align Tailgate |
| 365 | 1054-6 | Adjust clutch |
| 365 | 1054-6 | Adjust clutch |
| 365 | 1054-6 | Grease front end |
| 365 | 1054-6 | Grease front end |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------|
| 365 | 1054-6 | Repair tie rod |
| 365 | 1054-6 | Repair tie rod |
| 365 | 1054-6 | Rpr Tie Rod |
| 365 | 1054-6 | Weld chain holder |
| 365 | 1054-6 | Weld chain holder |
| 365 | 1178-6 | A Maint |
| 365 | 1178-6 | A Maint |
| 365 | 1178-6 | A Maint |
| 365 | 1178-6 | Repair engine stop cable |
| 365 | 1178-6 | Repair engine stop cable |
| 365 | 1178-6 | Repair PTO U-joint |
| 365 | 1178-6 | Repair PTO U-joint |
| 365 | 1178-6 | Repair wiring |
| 365 | 1178-6 | Repair wiring |
| 365 | 1178-6 | Replace backup switch |
| 365 | 1178-6 | Replace backup switch |
| 365 | 1178-6 | Replace hoist zert |
| 365 | 1178-6 | Replace hoist zert |
| 365 | 1178-6 | Replace PTO packing |
| 365 | 1178-6 | Replace PTO packing |
| 365 | 1178-6 | Replace window handle crank |
| 365 | 1178-6 | Replace window handle crank |
| 365 | 1243-6 | Lubricate |
| 365 | 1243-6 | Lubricate |
| 365 | 1243-6 | Misc Mower Rpr |
| 365 | 1243-6 | Replace air pot |
| 365 | 1243-6 | Replace air pot |
| 365 | 1243-6 | Replace blower motor |
| 365 | 1243-6 | Replace blower motor |
| 365 | 1243-6 | Replace leaf spring |
| 365 | 1243-6 | Replace leaf spring |
| 365 | 1243-6 | Replace rear spring |
| 365 | 1243-6 | Replace rear spring |
| 365 | 1243-6 | Replace rear spring bolt |
| 365 | 1243-6 | Replace rear spring bolt |
| 365 | 1243-6 | Replace rear spring bracket |
| 365 | 1243-6 | Replace rear spring bracket |
| 365 | 1243-6 | Replace rear wheel seal |
| 365 | 1243-6 | Replace rear wheel seal |
| 365 | 1243-6 | Replace spider |
| 365 | 1243-6 | Replace spider |
| 365 | 1243-6 | Weld rear spring bracket |
| 365 | 1243-6 | Weld rear spring bracket |
| 365 | 1541-6 | Align Brake Can |
| 365 | 1541-6 | Align brake can |
| 365 | 1541-6 | Align brake can |
| 365 | 1594-6 | Repair battery cable |
| 365 | 1594-6 | Repair battery hold down |
| 365 | 1594-6 | Replace batteries |
| 365 | 1594-6 | Replace bulb |
| 365 | 1594-6 | Rpl Batteries |
| 365 | 1632-6 | Fabricate new tailgate |
| 365 | 1632-6 | Repair fuel tank |
| 365 | 1632-6 | Repair PTO shaft |
| 365 | 1632-6 | Replace clutch |
| 365 | 1632-6 | Replace front spring |
| 365 | 1632-6 | Replace PTO shaft seal |
| 365 | 1632-6 | Replace transmisson |
| 365 | 1632-6 | Replace transmisson fluid |
| 365 | 1632-6 | Rpr PTO Shaft |
| 365 | 1647-6 | Weld Rack |
| 365 | 1647-6 | Weld rack |
| 365 | 1686-6 | Repair muffler |
| 365 | 1686-6 | Repair tire |
| 365 | 1686-6 | Replace backup alarm |
| 365 | 1686-6 | Replace bulb |
| 365 | 1686-6 | Replace rear center spring bolt |
| 365 | 1686-6 | Weld Muffler |
| 365 | 1686-6 | Weld muffler |
| 365 | 1834-6 | Repair bumper |
| 365 | 1834-6 | Repair muffler |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------|
| 365 | 1834-6 | Replace fuel filter |
| 365 | 1865-6 | Rpr Muffler |
| 365 | 1937-6 | Replace U-joint |
| 365 | 1937-6 | Service Call |
| 365 | 1937-6 | Service call |
| 365 | 1973-6 | Repair muffler |
| 365 | 1973-6 | Rpr Muffler |
| 365 | 1995-6 | Replace exhaust/muffler |
| 365 | 1995-6 | Rpl Exhaust/Muffler |
| 365 | 2094-6 | Replace pod |
| 365 | 2094-6 | Rpl Pod |
| 365 | 2113-6 | Repair tire |
| 365 | 2113-6 | Rpr Tire |
| 365 | 2130-6 | Adjust clutch |
| 365 | 2130-6 | Check front end |
| 365 | 2130-6 | Check rear spring bolt |
| 365 | 2130-6 | Replace tire |
| 365 | 2130-6 | Rpl Tire |
| 365 | 2228-6 | L Maint |
| 365 | 2228-6 | L Maint |
| 365 | 2228-6 | Repair engine stop cable |
| 365 | 2228-6 | Repair spring |
| 365 | 2228-6 | Replace front sheel lug studs |
| 365 | 2228-6 | Replace front wheel lug nut |
| 365 | 2228-6 | Replace L/F spring center bolt |
| 365 | 2280-6 | Weld Tailgate/Bracket |
| 365 | 2280-6 | Weld tailgate/bracket |
| 365 | 2304-6 | Repair exhaust pipe |
| 365 | 2304-6 | Repair right door |
| 365 | 2304-6 | Replace starter |
| 365 | 2304-6 | Rpl Starter |
| 365 | 2321-6 | Check front end |
| 365 | 2321-6 | Repair L/Front wheel bearing |
| 365 | 2321-6 | Repair spring shackle |
| 365 | 2321-6 | Repair tailgate |
| 365 | 2321-6 | Repair tire |
| 365 | 2321-6 | Rpr Tailgate |
| 365 | 2589-6 | Repair tires |
| 365 | 2589-6 | Service Call |
| 365 | 2589-6 | Service call |
| 365 | 3060-6 | Reweld Headache Rack |
| 365 | 3060-6 | Reweld headache rack |
| 365 | 3075-6 | Repair tire |
| 365 | 3075-6 | Rpr Tire |
| 365 | 3105-6 | Adjust clutch |
| 365 | 3105-6 | Replace fuel filters |
| 365 | 3105-6 | Replace fuse |
| 365 | 3105-6 | Rpl Fuel Filters |
| 365 | 3182-6 | Reface flywheel |
| 365 | 3182-6 | Repair air tank |
| 365 | 3182-6 | Repair ether bottle bracket |
| 365 | 3182-6 | Replace clutch |
| 365 | 3182-6 | Replace grease zerk |
| 365 | 3182-6 | Replace transmisson |
| 365 | 3182-6 | S Maint |
| 365 | 3182-6 | S Maint |
| 365 | 3221-6 | Repair wiring to fuel oil sende |
| 365 | 3221-6 | Service Call |
| 365 | 3221-6 | Service call |
| 365 | 3253-6 | Repair electrical connection |
| 365 | 3253-6 | Service Call |
| 365 | 3253-6 | Service call |
| 365 | 3301-6 | Add transmisson oil |
| 365 | 3301-6 | Adj Clutch |
| 365 | 3301-6 | Adjust clutch |
| 365 | 3301-6 | Tighten speedometer cable |
| 365 | 3385-6 | Greased bed/springs |
| 365 | 3385-6 | Replace bulb |
| 365 | 3385-6 | Replace pins |
| 365 | 3385-6 | Replace spring |
| 365 | 3385-6 | Replace U-bolts |

| FE# | DOC # | DESCRIPTION |
|-----|--------|--------------------------------|
| 367 | 0880-6 | Repair tailgate |
| 367 | 0880-6 | Repair temperature gage |
| 367 | 0880-6 | Repair temperature gage |
| 367 | 0880-6 | Repair tire |
| 367 | 0880-6 | Repair tire |
| 367 | 0880-6 | Replace fuel filter |
| 367 | 0880-6 | Replace fuel filter |
| 367 | 0880-6 | Replace PTO U-joint |
| 367 | 0880-6 | Replace PTO U-joint |
| 367 | 0880-6 | Replace speedometer cable |
| 367 | 0880-6 | Replace speedometer cable |
| 367 | 0880-6 | Replace transmission |
| 367 | 0880-6 | Replace transmission |
| 367 | 0880-6 | Rpl Transmission |
| 367 | 1045-6 | Repair/align tailgate |
| 367 | 1045-6 | Repair/align tailgate |
| 367 | 1045-6 | Replace bulb |
| 367 | 1045-6 | Replace bulb |
| 367 | 1045-6 | Replace shaft pins |
| 367 | 1045-6 | Replace shaft pins |
| 367 | 1045-6 | Replace tailgate pins |
| 367 | 1045-6 | Replace tailgate pins |
| 367 | 1045-6 | Rpr/Align Tailgate |
| 367 | 1248-6 | Replace heater motor (off 365) |
| 367 | 1248-6 | Replace heater motor (off 365) |
| 367 | 1248-6 | Rpl Heater Motor |
| 367 | 1258-6 | Repair engine shut off |
| 367 | 1258-6 | Repair engine shut off |
| 367 | 1258-6 | Repair tire |
| 367 | 1258-6 | Repair tire |
| 367 | 1258-6 | Replace tire |
| 367 | 1258-6 | Replace tire |
| 367 | 1258-6 | Weld Tailgate |
| 367 | 1258-6 | Weld tailgate |
| 367 | 1258-6 | Weld tailgate |
| 367 | 1346-6 | Replace tire |
| 367 | 1346-6 | Replace tire |
| 367 | 1346-6 | Rpl Tires |
| 367 | 1419-6 | Adjust tailgate latches |
| 367 | 1419-6 | Adjust tailgate latches |
| 367 | 1419-6 | Repair tailgate |
| 367 | 1419-6 | Repair tailgate |
| 367 | 1419-6 | Rpr Tailgate |
| 367 | 1420-6 | Repair tailgate linkage |
| 367 | 1420-6 | Repair tailgate linkage |
| 367 | 1420-6 | Rpr Tailgate Linkage |
| 367 | 1443-6 | Repair tire |
| 367 | 1443-6 | Repair tire |
| 367 | 1443-6 | Rpr Tire |
| 367 | 1458-6 | Replace differential oil |
| 367 | 1458-6 | Replace differential oil |
| 367 | 1458-6 | Replace transmission fluid |
| 367 | 1458-6 | Replace transmission fluid |
| 367 | 1458-6 | Rpl Transmission Oil |
| 367 | 1499-6 | Repair tire |
| 367 | 1499-6 | Repair tire |
| 367 | 1499-6 | Replace fuel filter |
| 367 | 1499-6 | Replace fuel filter |
| 367 | 1499-6 | Rpr Tire |
| 367 | 1526-6 | Cut ear off (tailgate) |
| 367 | 1526-6 | Cut ear off (tailgate) |
| 367 | 1526-6 | Service Batteries |
| 367 | 1526-6 | Service batteries |
| 367 | 1526-6 | Service batteries |
| 367 | 1589-6 | Repair tire |
| 367 | 1589-6 | Repair tire |
| 367 | 1589-6 | Rpr Tire |
| 367 | 1628-6 | Repair tire |
| 367 | 1628-6 | Repair tire |
| 367 | 1628-6 | Rpr Tire |
| 367 | 1746-6 | Fabricate new tailgate |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------|
| 365 | 3385-6 | Rpl Spring |
| 365 | 3569-6 | Add oil |
| 365 | 3569-6 | Check oil pressure |
| 365 | 3569-6 | Checked wiring |
| 365 | 3569-6 | Replace bulb |
| 365 | 3569-6 | Replace oil pressure gage (used |
| 365 | 3569-6 | Replace oil sending unit |
| 365 | 3569-6 | Rpl Oil Sending Unit |
| 365 | 3682-6 | Fabricate pin for tailgate |
| 365 | 3682-6 | Repair rear springs |
| 365 | 3682-6 | Repair tailgate |
| 365 | 3682-6 | Replace brake valve (off 367) |
| 365 | 3682-6 | Replace rear spring bolts |
| 365 | 3682-6 | Rpr Tailgate |
| 365 | 3682-6 | Weld hanger |
| 365 | 3768-6 | Repair tire |
| 365 | 3768-6 | Rpr Tire |
| 365 | 3950-6 | Adjust front brake pad |
| 365 | 3950-6 | Replace copper tubing |
| 365 | 3950-6 | Rpl Copper Tubing |
| 367 | 0020-6 | A Maint |
| 367 | 0020-6 | A Maint |
| 367 | 0020-6 | A Maint |
| 367 | 0020-6 | Manufactured snow plow mount |
| 367 | 0020-6 | Manufactured snow plow mount |
| 367 | 0020-6 | Replace bulb |
| 367 | 0020-6 | Replace bulb |
| 367 | 0020-6 | Replace rear wheel seal |
| 367 | 0020-6 | Replace rear wheel seal |
| 367 | 0194-6 | Replace tire |
| 367 | 0194-6 | Replace tire |
| 367 | 0194-6 | Rpl Tire |
| 367 | 0455-6 | Add transmission oil |
| 367 | 0455-6 | Add transmission oil |
| 367 | 0455-6 | Replace clutch |
| 367 | 0455-6 | Replace clutch |
| 367 | 0455-6 | Replace seals in PTO |
| 367 | 0455-6 | Replace seals in PTO |
| 367 | 0455-6 | Replace tie rod |
| 367 | 0455-6 | Replace tie rod |
| 367 | 0455-6 | Replace transmission |
| 367 | 0455-6 | Replace transmission |
| 367 | 0455-6 | Rpl Transmission |
| 367 | 0558-6 | Repair heater wire |
| 367 | 0558-6 | Repair heater wire |
| 367 | 0558-6 | Repair PTO key |
| 367 | 0558-6 | Repair PTO key |
| 367 | 0558-6 | Repair PTO U-joint |
| 367 | 0558-6 | Repair PTO U-joint |
| 367 | 0558-6 | Replace battery (used) |
| 367 | 0558-6 | Replace battery (used) |
| 367 | 0558-6 | Rpr PTO U-Joints |
| 367 | 0615-6 | Tighten Alternator Belt |
| 367 | 0615-6 | Tighten alternator belt |
| 367 | 0615-6 | Tighten alternator belt |
| 367 | 0645-6 | Repair speedometer cable |
| 367 | 0645-6 | Repair speedometer cable |
| 367 | 0645-6 | Repair tire |
| 367 | 0645-6 | Repair tire |
| 367 | 0645-6 | Replace fuel filter |
| 367 | 0645-6 | Replace fuel filter |
| 367 | 0645-6 | Rpr Speedometer Cable |
| 367 | 0710-6 | Repair tire |
| 367 | 0710-6 | Repair tire |
| 367 | 0710-6 | Rpr Tire |
| 367 | 0801-6 | Repair tire |
| 367 | 0801-6 | Repair tire |
| 367 | 0801-6 | Rpr Tire |
| 367 | 0880-6 | Adjust clutch |
| 367 | 0880-6 | Adjust clutch |
| 367 | 0880-6 | Repair tailgate |

| FE# | DOC # | DESCRIPTION |
|-------|--------|-----------------------------|
| ===== | ===== | ===== |
| 367 | 1746-6 | Fabricate new tailgate |
| 367 | 1746-6 | Misc Auto Rpr |
| 367 | 1746-6 | Repair heads |
| 367 | 1746-6 | Repair heads |
| 367 | 1746-6 | Repair light bracket |
| 367 | 1746-6 | Repair light bracket |
| 367 | 1746-6 | Repair tail light |
| 367 | 1746-6 | Repair tail light |
| 367 | 1746-6 | Repair tailgate bracket |
| 367 | 1746-6 | Repair tailgate bracket |
| 367 | 1746-6 | Replace clutch pad |
| 367 | 1746-6 | Replace clutch pad |
| 367 | 1746-6 | Replace dump linkage |
| 367 | 1746-6 | Replace dump linkage |
| 367 | 1746-6 | Replace exhaust system |
| 367 | 1746-6 | Replace exhaust system |
| 367 | 1746-6 | Replace gasket set |
| 367 | 1746-6 | Replace gasket set |
| 367 | 1746-6 | Replace lamp |
| 367 | 1746-6 | Replace lamp |
| 367 | 1746-6 | Replace muffler clamp |
| 367 | 1746-6 | Replace muffler clamp |
| 367 | 1746-6 | Replace spring front |
| 367 | 1746-6 | Replace spring front |
| 367 | 1746-6 | S Maint |
| 367 | 1746-6 | S Maint |
| 367 | 1746-6 | Weld chain holder |
| 367 | 1746-6 | Weld chain holder |
| 367 | 1752-6 | Adjust door |
| 367 | 1752-6 | Adjust door |
| 367 | 1752-6 | L Maint |
| 367 | 1752-6 | L Maint |
| 367 | 1752-6 | L Maint |
| 367 | 1752-6 | Repair bed tailgate linkage |
| 367 | 1752-6 | Repair bed tailgate linkage |
| 367 | 1752-6 | Repair clearance let |
| 367 | 1752-6 | Repair clearance let |
| 367 | 1752-6 | Replace clearance lite |
| 367 | 1752-6 | Replace clearance lite |
| 367 | 1752-6 | Replace door |
| 367 | 1752-6 | Replace door |
| 367 | 1752-6 | Replace heat gage |
| 367 | 1752-6 | Replace heat gage |
| 367 | 2390-6 | Repair muffler |
| 367 | 2390-6 | Repair muffler |
| 367 | 2390-6 | Repair muffler bracket |
| 367 | 2390-6 | Repair muffler bracket |
| 367 | 2390-6 | Rpr Muffler |
| 367 | 2390-6 | Weld pipe to muffler |
| 367 | 2390-6 | Weld pipe to muffler |
| 367 | 2421-6 | Replace battery |
| 367 | 2421-6 | Replace battery |
| 367 | 2421-6 | Service Call |
| 367 | 2421-6 | Service call |
| 367 | 2421-6 | Service call |
| 367 | 2441-6 | Repair tire |
| 367 | 2441-6 | Repair tire |
| 367 | 2441-6 | Rpr Tire |
| 367 | 2450-6 | Repair radiator cap |
| 367 | 2450-6 | Repair radiator cap |
| 367 | 2450-6 | Replace antifreeze |
| 367 | 2450-6 | Replace antifreeze |
| 367 | 2450-6 | Replace heater hose |
| 367 | 2450-6 | Replace heater hose |
| 367 | 2450-6 | Replace hose |
| 367 | 2450-6 | Replace hose |
| 367 | 2450-6 | Replace radiator cap |
| 367 | 2450-6 | Replace radiator cap |
| 367 | 2450-6 | Replace thermostat |
| 367 | 2450-6 | Replace thermostat |
| 367 | 2450-6 | Service Call |

| FE# | DOC # | DESCRIPTION |
|-------|--------|---------------------------------|
| ===== | ===== | ===== |
| 367 | 2450-6 | Service call |
| 367 | 2450-6 | Service call |
| 367 | 2497-6 | Replace antifreeze |
| 367 | 2497-6 | Replace antifreeze |
| 367 | 2497-6 | Replace radiator |
| 367 | 2497-6 | Replace radiator |
| 367 | 2497-6 | Rpl Radiator |
| 367 | 2712-6 | Adjust brakes |
| 367 | 2712-6 | Adjust brakes |
| 367 | 2712-6 | Repair bed linkage |
| 367 | 2712-6 | Repair bed linkage |
| 367 | 2712-6 | Repair spider |
| 367 | 2712-6 | Repair spider |
| 367 | 2712-6 | Repair tie rod |
| 367 | 2712-6 | Repair tie rod |
| 367 | 2712-6 | Replace camshaft bracket (used) |
| 367 | 2712-6 | Replace camshaft bracket (used) |
| 367 | 2712-6 | Replace muffler |
| 367 | 2712-6 | Replace muffler |
| 367 | 2712-6 | Replace muffler clamp |
| 367 | 2712-6 | Replace muffler clamp |
| 367 | 2712-6 | Replace tail pipe |
| 367 | 2712-6 | Replace tail pipe |
| 367 | 2712-6 | Replace transmission oil |
| 367 | 2712-6 | Replace transmission oil |
| 367 | 2712-6 | Rpl Muffler/Misc Rpr |
| 367 | 2762-6 | Repair hose |
| 367 | 2762-6 | Repair hose |
| 367 | 2762-6 | Repair injection line |
| 367 | 2762-6 | Repair injection line |
| 367 | 2762-6 | Repair wiring |
| 367 | 2762-6 | Repair wiring |
| 367 | 2762-6 | Replace fuel filter |
| 367 | 2762-6 | Replace fuel filter |
| 367 | 2762-6 | Rpr Injection Line |
| 367 | 2773-6 | Overheating |
| 367 | 2773-6 | Overheating |
| 367 | 2773-6 | Overheating |
| 367 | 3162-5 | Repair tire |
| 367 | 3162-5 | Repair tire |
| 367 | 3162-6 | Rpr Tire |
| 367 | 3284-6 | L Maint |
| 367 | 3284-6 | L Maint |
| 367 | 3284-6 | L Maint |
| 367 | 3294-6 | S Maint |
| 367 | 3297-6 | Replace belt tension spring |
| 367 | 3297-6 | Replace belt tension spring |
| 367 | 3297-6 | Rpl Belt Tension Spring |
| 367 | 3300-6 | Replace ether bottle |
| 367 | 3300-6 | Replace ether bottle |
| 367 | 3300-6 | Replace spring |
| 367 | 3300-6 | Replace spring |
| 367 | 3300-6 | Rpl Ether Bottle |
| 367 | 3346-6 | Adjust clutch |
| 367 | 3346-6 | Adjust clutch |
| 367 | 3346-6 | Replace bearing 2 |
| 367 | 3346-6 | Replace bearing 2 |
| 367 | 3346-6 | Replace lock washer |
| 367 | 3346-6 | Replace lock washer |
| 367 | 3346-6 | Replace transmission |
| 367 | 3346-6 | Replace transmission |
| 367 | 3346-6 | Replace transmission oil |
| 367 | 3346-6 | Replace transmission oil |
| 367 | 3346-6 | Replace window crank bracket (u |
| 367 | 3346-6 | Replace window crank bracket (u |
| 367 | 3346-6 | Rpl Transmission |
| 367 | 3404-6 | Adjust clutch |
| 367 | 3404-6 | Adjust clutch |
| 367 | 3404-6 | Misc Auto Rpr |
| 367 | 3404-6 | Replace O-ring |
| 367 | 3404-6 | Replace O-ring |

| FE# | DOC # | DESCRIPTION |
|-----|--------|---------------------------------|
| 367 | 3404-6 | Replace rear seal |
| 367 | 3404-6 | Replace rear seal |
| 367 | 3404-6 | Replace rear seal on trans (use |
| 367 | 3404-6 | Replace rear seal on trans (use |
| 367 | 3404-6 | Replace transmisson oil |
| 367 | 3404-6 | Replace transmisson oil |
| 367 | 3404-6 | Replace u-joint |
| 367 | 3404-6 | Replace u-joint |
| 367 | 3568-6 | Replace compressor |
| 367 | 3568-6 | Replace compressor |
| 367 | 3568-6 | Replace oil line fitting (used) |
| 367 | 3568-6 | Replace oil line fitting (used) |
| 367 | 3568-6 | Replace oil line (used) |
| 367 | 3568-6 | Replace oil line (used) |
| 367 | 3568-6 | Rpl Compressor |
| 367 | 3575-6 | Repair PTO shaft |
| 367 | 3575-6 | Repair PTO shaft |
| 367 | 3575-6 | Replace u-joint yoke key |
| 367 | 3575-6 | Replace u-joint yoke key |
| 367 | 3575-6 | Rpr PTO Shaft |
| 375 | 0004-6 | A Maint |
| 375 | 0004-6 | A Maint |
| 375 | 0004-6 | A Maint |
| 375 | 0004-6 | Install sand spreader |
| 375 | 0004-6 | Install sand spreader |
| 375 | 0004-6 | Repair 2-speed wiring |
| 375 | 0004-6 | Repair 2-speed wiring |
| 375 | 0004-6 | Replace front wheel bearing |
| 375 | 0004-6 | Replace front wheel bearing |
| 375 | 0004-6 | Replace front wheel cone |
| 375 | 0004-6 | Replace front wheel cone |
| 375 | 0004-6 | Replace quick coupler for sprea |
| 375 | 0004-6 | Replace quick coupler for sprea |
| 375 | 0004-6 | Replace starter |
| 375 | 0004-6 | Replace starter |
| 375 | 0004-6 | Replace tail light assy |
| 375 | 0004-6 | Replace tail light assy |
| 375 | 0004-6 | Replace voltage regulator |
| 375 | 0004-6 | Replace voltage regulator |
| 375 | 0174-6 | Repair exhaust |
| 375 | 0174-6 | Repair exhaust |
| 375 | 0174-6 | Rpr Exhaust |
| 375 | 0298-6 | Repair carburetor |
| 375 | 0298-6 | Repair carburetor |
| 375 | 0298-6 | Repair points |
| 375 | 0298-6 | Repair points |
| 375 | 0298-6 | Replace air cleaner |
| 375 | 0298-6 | Replace air cleaner |
| 375 | 0298-6 | Replace condensor |
| 375 | 0298-6 | Replace condensor |
| 375 | 0298-6 | Replace distributor |
| 375 | 0298-6 | Replace distributor |
| 375 | 0298-6 | Replace ignition points |
| 375 | 0298-6 | Replace ignition points |
| 375 | 0298-6 | Rpr Carburetor |
| 375 | 0320-6 | Clean carburetor |
| 375 | 0320-6 | Clean carburetor |
| 375 | 0320-6 | Misc Auto Rpr |
| 375 | 0320-6 | Rebuild carburetor |
| 375 | 0320-6 | Rebuild carburetor |
| 375 | 0320-6 | Repair tire |
| 375 | 0320-6 | Repair tire |
| 375 | 0320-6 | Replace air filter |
| 375 | 0320-6 | Replace air filter |
| 375 | 0320-6 | Replace distributor |
| 375 | 0320-6 | Replace distributor |
| 375 | 0320-6 | Replace fuel filter |
| 375 | 0320-6 | Replace fuel filter |
| 375 | 0320-6 | Replace in line fuel filter |
| 375 | 0320-6 | Replace in line fuel filter |
| 375 | 0320-6 | Replace plug wires |

| FE# | DOC # | DESCRIPTION |
|-----|--------|-----------------------------|
| 375 | 0320-6 | Replace plug wires |
| 375 | 0320-6 | Replace PTO U-joints |
| 375 | 0320-6 | Replace PTO U-joints |
| 375 | 0320-6 | Replace solenoid relay |
| 375 | 0320-6 | Replace solenoid relay |
| 375 | 0320-6 | Replace spark plug |
| 375 | 0320-6 | Replace spark plug |
| 375 | 0320-6 | Reroute fuel line |
| 375 | 0320-6 | Reroute fuel line |
| 375 | 0476-6 | Check charging system |
| 375 | 0476-6 | Check charging system |
| 375 | 0476-6 | Replace battery |
| 375 | 0476-6 | Replace battery |
| 375 | 0476-6 | Rpl Battery |
| 375 | 0565-6 | Lubricate |
| 375 | 0565-6 | Lubricate |
| 375 | 0565-6 | Misc Auto Rpr |
| 375 | 0565-6 | Repair bracket |
| 375 | 0565-6 | Repair bracket |
| 375 | 0565-6 | Replace bulbs |
| 375 | 0565-6 | Replace bulbs |
| 375 | 0565-6 | Replace dimmer switch |
| 375 | 0565-6 | Replace dimmer switch |
| 375 | 0565-6 | Replace oil/filter (engine) |
| 375 | 0565-6 | Replace oil/filter (engine) |
| 375 | 0565-6 | Replace red light assy |
| 375 | 0565-6 | Replace red light assy |
| 375 | 0565-6 | Replace reflector |
| 375 | 0565-6 | Replace reflector |
| 375 | 0565-6 | Replace tail light assy |
| 375 | 0565-6 | Replace tail light assy |
| 375 | 0565-6 | Replace thermostats |
| 375 | 0565-6 | Replace thermostats |
| 375 | 0597-6 | Install Light |
| 375 | 0597-6 | Install light |
| 375 | 0597-6 | Install light |
| 375 | 0617-6 | Replace distributor |
| 375 | 0617-6 | Replace distributor |
| 375 | 0617-6 | Rpl Distributor |
| 375 | 0716-6 | Check parts |
| 375 | 0716-6 | Check parts |
| 375 | 0716-6 | Chk Parts |
| 375 | 0809-6 | Adjust alternator belt |
| 375 | 0809-6 | Adjust alternator belt |
| 375 | 0809-6 | Check charging system |
| 375 | 0809-6 | Check charging system |
| 375 | 0809-6 | Chk Charging Sys |
| 375 | 0983-6 | Adjust carburetor |
| 375 | 0983-6 | Adjust carburetor |
| 375 | 0983-6 | L Maint |
| 375 | 0983-6 | L Maint |
| 375 | 0983-6 | L Maint |
| 375 | 0983-6 | Repair PTO shaft |
| 375 | 0983-6 | Repair PTO shaft |
| 375 | 0983-6 | Replace compressor filter |
| 375 | 0983-6 | Replace compressor filter |
| 375 | 0983-6 | Replace exhaust clamp |
| 375 | 0983-6 | Replace exhaust clamp |
| 375 | 0983-6 | Replace exhaust gasket |
| 375 | 0983-6 | Replace exhaust gasket |
| 375 | 0983-6 | Replace exhaust pipe |
| 375 | 0983-6 | Replace exhaust pipe |
| 375 | 0983-6 | Replace upper radiator hose |
| 375 | 0983-6 | Replace upper radiator hose |
| 375 | 1195-6 | Repair dump bed/tailgate |
| 375 | 1195-6 | Repair dump bed/tailgate |
| 375 | 1195-6 | Replace seat |
| 375 | 1195-6 | Replace seat |
| 375 | 1195-6 | Rpr Bed/Tailgate |
| 375 | 1418-6 | Replace heater motor |
| 375 | 1418-6 | Replace heater motor |

| FE# | DOC # | DESCRIPTION |
|-----|--------|--------------------------------|
| 375 | 1418-6 | Rpl Heater Motor |
| 375 | 1456-6 | Adjust timing |
| 375 | 1456-6 | Adjust timing |
| 375 | 1456-6 | Misc Auto Rpr |
| 375 | 1456-6 | Replac air filter |
| 375 | 1456-6 | Replac air filter |
| 375 | 1456-6 | Replace fuel filter |
| 375 | 1456-6 | Replace fuel filter |
| 375 | 1456-6 | Replace spark plugs |
| 375 | 1456-6 | Replace spark plugs |
| 375 | 1775-6 | Adj Emergency Brake |
| 375 | 1775-6 | Adjust emergency brake |
| 375 | 1775-6 | Adjust emergency brake |
| 375 | 1828-6 | Adjust clutch |
| 375 | 1828-6 | Adjust clutch |
| 375 | 1828-6 | Repair tailgate |
| 375 | 1828-6 | Repair tailgate |
| 375 | 1828-6 | Rpr Tailgate |
| 375 | 2121-6 | Repair tire |
| 375 | 2121-6 | Repair tire |
| 375 | 2121-6 | Rpr Tire |
| 375 | 2143-6 | Repair muffler |
| 375 | 2143-6 | Repair muffler |
| 375 | 2143-6 | S Maint |
| 375 | 2143-6 | S Maint |
| 375 | 2143-6 | S Maint |
| 375 | 2220-6 | Add oil |
| 375 | 2220-6 | Add oil |
| 375 | 2220-6 | Adjust parking brakes |
| 375 | 2220-6 | Adjust parking brakes |
| 375 | 2220-6 | Misc Auto Rpr |
| 375 | 2220-6 | Repair muffler |
| 375 | 2220-6 | Repair muffler |
| 375 | 2220-6 | Tighten all transmission bolts |
| 375 | 2220-6 | Tighten all transmission bolts |
| 375 | 2468-6 | Install heater shut off |
| 375 | 2468-6 | Install heater shut off |
| 375 | 2468-6 | Repair PTO Shaft |
| 375 | 2468-6 | Repair PTO Shaft |
| 375 | 2468-6 | Repair PTO shaft bracket |
| 375 | 2468-6 | Repair PTO shaft bracket |
| 375 | 2468-6 | Rpr PTO Shaft |
| 375 | 2644-6 | Repair clutch linkage |
| 375 | 2644-6 | Repair clutch linkage |
| 375 | 2644-6 | Rpr Clutch Linkage |
| 375 | 2921-6 | Adjust carburetor |
| 375 | 2921-6 | Adjust carburetor |
| 375 | 2921-6 | Misc Auto Rpr |
| 375 | 2921-6 | Repair wiring to horn |
| 375 | 2921-6 | Repair wiring to horn |
| 375 | 2921-6 | Replace bearing |
| 375 | 2921-6 | Replace bearing |
| 375 | 2921-6 | Replace diaphragm |
| 375 | 2921-6 | Replace diaphragm |
| 375 | 2921-6 | Replace plugs |
| 375 | 2921-6 | Replace plugs |
| 375 | 2921-6 | Sun test |
| 375 | 2921-6 | Sun test |
| 375 | 3209-6 | L Maint |
| 375 | 3209-6 | L Maint |
| 375 | 3209-6 | L Maint |
| 375 | 3243-6 | Replace bolt/lock washer |
| 375 | 3243-6 | Replace bolt/lock washer |
| 375 | 3243-6 | Steam Clean |
| 375 | 3243-6 | Steam clean |
| 375 | 3243-6 | Steam clean |
| 375 | 3243-6 | Tighten transmission bolts |
| 375 | 3243-6 | Tighten transmission bolts |
| 375 | 3536-6 | Tighten Bolts |
| 375 | 3536-6 | Tighten bolts |
| 375 | 3536-6 | Tighten bolts |

| FE# | DOC # | DESCRIPTION |
|-----|--------|-------------------------|
| 393 | 0232-6 | L Maint |
| 393 | 0232-6 | L Maint |
| 393 | 0232-6 | L Maint |
| 393 | 0232-6 | Repair muffler clamp |
| 393 | 0232-6 | Repair muffler clamp |
| 393 | 0232-6 | Repair tire |
| 393 | 0232-6 | Repair tire |
| 393 | 0232-6 | Repair wiring |
| 393 | 0232-6 | Repair wiring |
| 393 | 0232-6 | Replace plugs |
| 393 | 0232-6 | Replace plugs |
| 393 | 0232-6 | Replce manifold bolt |
| 393 | 0232-6 | Replce manifold bolt |
| 393 | 0442-6 | Adjust clutch |
| 393 | 0442-6 | Adjust clutch |
| 393 | 0442-6 | Repair carburetor |
| 393 | 0442-6 | Repair carburetor |
| 393 | 0442-6 | Repair wiring |
| 393 | 0442-6 | Repair wiring |
| 393 | 0442-6 | Replace cylinder key |
| 393 | 0442-6 | Replace cylinder key |
| 393 | 0442-6 | Replace ignition switch |
| 393 | 0442-6 | Replace ignition switch |
| 393 | 0442-6 | Replace tail/stop lamp |
| 393 | 0442-6 | Replace tail/stop lamp |
| 393 | 0442-6 | Service Call |
| 393 | 0442-6 | Service call |
| 393 | 0442-6 | Service call |
| 393 | 0568-6 | Repair defroster hose |
| 393 | 0568-6 | Repair defroster hose |
| 393 | 0568-6 | Replace plug |
| 393 | 0568-6 | Replace plug |
| 393 | 0568-6 | Replace plug wires |
| 393 | 0568-6 | Replace plug wires |
| 393 | 0568-6 | Replace points |
| 393 | 0568-6 | Replace points |
| 393 | 0568-6 | Rpr Defroster Hose |
| 393 | 0616-6 | Replace distributor cap |
| 393 | 0616-6 | Replace distributor cap |
| 393 | 0616-6 | Replace spark plug |
| 393 | 0616-6 | Replace spark plug |
| 393 | 0616-6 | Replace starter |
| 393 | 0616-6 | Replace starter |
| 393 | 0616-6 | Rpl Starter |
| 393 | 0767-6 | Tune Engine |
| 393 | 0767-6 | Tune engine |
| 393 | 0767-6 | Tune engine |
| 393 | 1117-6 | Replace tiretibe |
| 393 | 1117-6 | Replace tiretibe |
| 393 | 1117-6 | Service Call |
| 393 | 1117-6 | Service call |
| 393 | 1117-6 | Service call |
| 393 | 1233-6 | Replace u-joint |
| 393 | 1233-6 | Replace u-joint |
| 393 | 1233-6 | Rpl U-Joint |
| 393 | 1261-6 | Repair tire |
| 393 | 1261-6 | Repair tire |
| 393 | 1261-6 | Rpr Tire |
| 393 | 1490-6 | Tune Engine |
| 393 | 1490-6 | Tune engine |
| 393 | 1490-6 | Tune engine |
| 393 | 1546-6 | Repair PTO linkage |
| 393 | 1546-6 | Repair PTO linkage |
| 393 | 1546-6 | Repalce u-joint |
| 393 | 1546-6 | Repalce u-joint |
| 393 | 1546-6 | Replace yoke |
| 393 | 1546-6 | Replace yoke |
| 393 | 1546-6 | Rpr PTO Linkage |
| 393 | 1637-6 | Repair emergency brake |
| 393 | 1637-6 | Repair emergency brake |
| 393 | 1637-6 | Repair fuel filter |

| FE# | DOC # | DESCRIPTION |
|-----|--------|------------------------------|
| 393 | 1637-6 | Repair fuel filter |
| 393 | 1637-6 | Repair muffler bracket |
| 393 | 1637-6 | Repair muffler bracket |
| 393 | 1637-6 | Replace condenser |
| 393 | 1637-6 | Replace condenser |
| 393 | 1637-6 | Replace points |
| 393 | 1637-6 | Replace points |
| 393 | 1637-6 | Rpr Emergency Brake |
| 393 | 1637-6 | Service call |
| 393 | 1637-6 | Service call |
| 393 | 1732-6 | Repair heater motor |
| 393 | 1732-6 | Repair heater motor |
| 393 | 1732-6 | Repair lights |
| 393 | 1732-6 | Repair lights |
| 393 | 1732-6 | Repair power steering line |
| 393 | 1732-6 | Repair power steering line |
| 393 | 1732-6 | Repair wiring |
| 393 | 1732-6 | Repair wiring |
| 393 | 1732-6 | Repalce transmisson |
| 393 | 1732-6 | Repalce transmisson |
| 393 | 1732-6 | Replace muffler |
| 393 | 1732-6 | Replace muffler |
| 393 | 1732-6 | Replace parking brake drum |
| 393 | 1732-6 | Replace parking brake drum |
| 393 | 1732-6 | Replace parking brake lining |
| 393 | 1732-6 | Replace parking brake lining |
| 393 | 1732-6 | Replace spark plug |
| 393 | 1732-6 | Replace spark plug |
| 393 | 1732-6 | S Maint |
| 393 | 1732-6 | S Maint |
| 393 | 1732-6 | S Maint |
| 393 | 1759-6 | Repair clutch |
| 393 | 1759-6 | Repair clutch |
| 393 | 1759-6 | Repair hoses |
| 393 | 1759-6 | Repair hoses |
| 393 | 1759-6 | Replace tail light |
| 393 | 1759-6 | Replace tail light |
| 393 | 1759-6 | Service Left Cylinder |
| 393 | 1759-6 | Service left cyliner |
| 393 | 1759-6 | Service left cyliner |
| 393 | 1852-6 | Repair tire |
| 393 | 1852-6 | Repair tire |
| 393 | 1852-6 | Rpr Tire |
| 393 | 2054-6 | Service Call |
| 393 | 2161-6 | L Maint |
| 393 | 2161-6 | L Maint |
| 393 | 2161-6 | L Maint |
| 393 | 2161-6 | Repair tie rod |
| 393 | 2161-6 | Repair tie rod |
| 393 | 2161-6 | Repair wiring |
| 393 | 2161-6 | Repair wiring |
| 393 | 2765-6 | Repair air line |
| 393 | 2765-6 | Repair air line |
| 393 | 2765-6 | Replace key |
| 393 | 2765-6 | Replace key |
| 393 | 2765-6 | Rpl Key |
| 393 | 3020-6 | Add hydraulic oil |
| 393 | 3020-6 | Add hydraulic oil |
| 393 | 3020-6 | Repair hydraulic line |
| 393 | 3020-6 | Repair hydraulic line |
| 393 | 3020-6 | Repair PTO shaft |
| 393 | 3020-6 | Repair PTO shaft |
| 393 | 3020-6 | Repair wiring |
| 393 | 3020-6 | Repair wiring |
| 393 | 3020-6 | Replace bulb |
| 393 | 3020-6 | Replace bulb |
| 393 | 3020-6 | Replace seal |
| 393 | 3020-6 | Replace seal |
| 393 | 3020-6 | Rpr Hydraulic Line |
| 393 | 3045-6 | Clean points/dist cap |
| 393 | 3045-6 | Clean points/dist cap |

| FE# | DOC # | DESCRIPTION |
|-----|--------|--------------------------|
| 393 | 3045-6 | Service Call |
| 393 | 3045-6 | Service call |
| 393 | 3045-6 | Service call |
| 393 | 3054-6 | Lubricate |
| 393 | 3054-6 | Lubricate |
| 393 | 3054-6 | Replace battery clamp |
| 393 | 3054-6 | Replace battery clamp |
| 393 | 3054-6 | Replace clutch |
| 393 | 3054-6 | Replace clutch |
| 393 | 3054-6 | Replace drive cap |
| 393 | 3054-6 | Replace drive cap |
| 393 | 3054-6 | Replace gasket |
| 393 | 3054-6 | Replace gasket |
| 393 | 3054-6 | Replace oil |
| 393 | 3054-6 | Replace oil |
| 393 | 3054-6 | Replace oil filter |
| 393 | 3054-6 | Replace oil filter |
| 393 | 3054-6 | Replace seal |
| 393 | 3054-6 | Replace seal |
| 393 | 3054-6 | Replace snap ring |
| 393 | 3054-6 | Replace snap ring |
| 393 | 3054-6 | Rpl Clutch |
| 393 | 3168-6 | Adj Brakes |
| 393 | 3168-6 | Adjust brakes |
| 393 | 3168-6 | Adjust brakes |
| 393 | 3168-6 | Adjust spreader pump |
| 393 | 3168-6 | Adjust spreader pump |
| 393 | 3277-6 | CK Rear Brake |
| 393 | 3448-6 | Adj Brakes |
| 393 | 3448-6 | Adjust brakes |
| 393 | 3448-6 | Adjust brakes |
| 393 | 3448-6 | Replace hyd cyl ram bolt |
| 393 | 3448-6 | Replace hyd cyl ram bolt |
| 393 | 3549-6 | Repair tire |
| 393 | 3549-6 | Repair tire |
| 393 | 3549-6 | Wash Mower |
| 393 | 3661-6 | A Maint |
| 393 | 3661-6 | A Maint |
| 393 | 3661-6 | A Maint |
| 393 | 3661-6 | Repair tail light wiring |
| 393 | 3661-6 | Repair tail light wiring |
| 393 | 3661-6 | Repair tire |
| 393 | 3661-6 | Repair tire |
| 393 | 3661-6 | Repair transmisson |
| 393 | 3661-6 | Repair transmisson |
| 393 | 3661-6 | Replace dimmer switch |
| 393 | 3661-6 | Replace dimmer switch |
| 393 | 3661-6 | Replace head light wire |
| 393 | 3661-6 | Replace head light wire |
| 393 | 3661-6 | Replace muffler clamp |
| 393 | 3661-6 | Replace muffler clamp |
| 393 | 3661-6 | Weld tail gate |
| 393 | 3661-6 | Weld tail gate |
| 393 | 3777-6 | Chech rear brake |
| 393 | 3777-6 | Chech rear brake |
| 476 | 0014-6 | Repair tire |
| 476 | 0014-6 | Replace wheel seal |
| 476 | 0014-6 | Rpl Wheel Seal |
| 476 | 0019-6 | Replace wheel seal |
| 476 | 0019-6 | Rpl Wheel Seal |
| 476 | 0124-6 | Repair tire |
| 476 | 0124-6 | Replace spark plug |
| 476 | 0124-6 | Rpl Spark Plug |
| 476 | 0139-6 | Service Call |
| 476 | 0139-6 | Service Call |
| 476 | 0225-6 | Misc Auto Rpr |
| 476 | 0225-6 | Repack bearing |
| 476 | 0225-6 | Repair tire |
| 476 | 0225-6 | Replace bearing seal |
| 476 | 0225-6 | Replace eye bolt |
| 476 | 0225-6 | Replace wheel motor |

| FE# | DOC # | DESCRIPTION |
|-----|--------|-------------------------------|
| 476 | 0225-6 | Replace wheel seal |
| 476 | 0317-6 | Adjust carburetor |
| 476 | 0317-6 | Replace strut camper |
| 476 | 0317-6 | Service Call |
| 476 | 0317-6 | Service Call |
| 476 | 0379-6 | Clean all terminal connectors |
| 476 | 0379-6 | Replace battery |
| 476 | 0379-6 | Rpl Battery |
| 476 | 1421-6 | Q Maint |
| 476 | 1421-6 | Q Maint |
| 476 | 1421-6 | Rebuild engine |
| 476 | 1421-6 | Replace bushing tail wheel |
| 476 | 1421-6 | Replace caster arm |
| 476 | 1421-6 | Replace choke control |
| 476 | 1421-6 | Replace fuel gage/cap |
| 476 | 1421-6 | Replace hyd oil filter |
| 476 | 1421-6 | Replace spring control rod |
| 476 | 1421-6 | Replace switch clutch |
| 476 | 1421-6 | Replace wiring harness |
| 476 | 1421-6 | Sharpen blades |
| 476 | 1466-6 | Q Maint |
| 476 | 1466-6 | Q Maint |
| 476 | 1876-6 | Misc Auto Rpr |
| 476 | 1876-6 | Replace coil assy |
| 476 | 1876-6 | Replace condensor |
| 476 | 1876-6 | Replace gear box oil |
| 476 | 1876-6 | Replace point plunger |
| 476 | 1876-6 | Replace point set |
| 476 | 1980-6 | Replace ignition switch |
| 476 | 1980-6 | Service Call |
| 476 | 1980-6 | Service Call |
| 476 | 2013-6 | Repair wire |
| 476 | 2013-6 | Rpr Wire |
| 476 | 2062-6 | Repair tire |
| 476 | 2062-6 | Rpr Tire |
| 476 | 2108-6 | Repair wires |
| 476 | 2108-6 | Rpr Wires |
| 476 | 2131-6 | Adjust carburetor |
| 476 | 2131-6 | Replace cable throttle |
| 476 | 2131-6 | Rpl Cable Throttle |
| 476 | 2145-6 | Repair starter switch |
| 476 | 2145-6 | Replace washer |
| 476 | 2145-6 | Rpr Starter Switch |
| 476 | 2179-6 | Replace tail wheel |
| 476 | 2179-6 | Rpl Tail Wheel |
| 476 | 2262-6 | Replace carburetor |
| 476 | 2262-6 | Rpl Carburetor |
| 476 | 2262-6 | Service battery |
| 476 | 2273-6 | Q Maint |
| 476 | 2273-6 | Q Maint |
| 476 | 2273-6 | Replace fuel line |
| 476 | 2273-6 | Replace fuel pump |
| 476 | 2273-6 | Weld hood |
| 476 | 2351-6 | Add engine oil |
| 476 | 2351-6 | Misc Auto Rpr |
| 476 | 2351-6 | Rebuild governor mag |
| 476 | 2351-6 | Replace coil |
| 476 | 2351-6 | Replace ignition points |
| 476 | 2351-6 | Replace rod breaker plunger |
| 476 | 2351-6 | Replace spark plug |
| 476 | 2351-6 | Weld holes in fender |
| 476 | 2403-6 | Repair tire |
| 476 | 2403-6 | Replace balde |
| 476 | 2403-6 | Replace balde bolt |
| 476 | 2403-6 | Replace tail wheel assy |
| 476 | 2403-6 | Rpl Tail Wheel Assy |
| 476 | 2432-6 | Q Maint |
| 476 | 2432-6 | Q Maint |
| 476 | 2432-6 | Replace muffler clamp |
| 476 | 2494-6 | Weld Seat Frame |
| 476 | 2494-6 | Weld seat frame |

| FE# | DOC # | DESCRIPTION |
|-----|--------|--------------------------------|
| 476 | 2528-6 | Adjust valves |
| 476 | 2528-6 | Clean/lap valves |
| 476 | 2528-6 | Misc Auto Rpr |
| 476 | 2528-6 | Replace engine oil |
| 476 | 2528-6 | Replace fuel cap/gage |
| 476 | 2528-6 | Replace muffler clamp |
| 476 | 2528-6 | Replace oil filter |
| 476 | 2625-6 | Add engine oil |
| 476 | 2625-6 | Adjust carburetor |
| 476 | 2625-6 | Rebuilt fuel pump |
| 476 | 2625-6 | Repair blade shaft |
| 476 | 2625-6 | Replace carburetor |
| 476 | 2625-6 | Replace cutter blade |
| 476 | 2625-6 | Rpl Carburetor |
| 476 | 2662-6 | Replace deck spring |
| 476 | 2662-6 | Rpl Deck Spring |
| 476 | 2698-6 | Misc Auto Rpr |
| 476 | 2698-6 | Repair regulator wire |
| 476 | 2698-6 | Replace bearing |
| 476 | 2698-6 | Replace blade |
| 476 | 2698-6 | Replace regulator |
| 476 | 2698-6 | Replace spindle shaft |
| 476 | 2698-6 | Replace wheel motor |
| 476 | 2755-6 | Misc Auto Rpr |
| 476 | 2755-6 | Replace deck spring hangers |
| 476 | 2755-6 | Replace tail wheel |
| 476 | 2755-6 | Replace tail wheel rim |
| 476 | 2764-6 | Q Maint |
| 476 | 2764-6 | Q Maint |
| 476 | 2764-6 | Replace blade |
| 476 | 2764-6 | Replace blade saddle |
| 476 | 2764-6 | Replace cutter housing bearing |
| 476 | 2764-6 | Replace spindle shaft |
| 476 | 2876-6 | Repair ground wire |
| 476 | 2876-6 | Service Call |
| 476 | 2876-6 | Service Call |
| 476 | 2896-6 | Q Maint |
| 476 | 2896-6 | Q Maint |
| 476 | 2896-6 | Replace blade |
| 476 | 2896-6 | Replace blade shaft spindle |
| 476 | 2935-6 | Replace starter motor (used) |
| 476 | 2935-6 | Service Call |
| 476 | 2935-6 | Service Call |
| 476 | 3036-6 | Adjust steering |
| 476 | 3036-6 | Q Maint |
| 476 | 3036-6 | Q Maint |
| 476 | 3036-6 | Repair deck blades |
| 476 | 3036-6 | Replace muffler |
| 476 | 3036-6 | Rpr Deck Blades |
| 476 | 3155-6 | Replace clamp |
| 476 | 3155-6 | Replace muffler |
| 476 | 3155-6 | Rpl Muffler |
| 476 | 3179-6 | Adjust steering |
| 476 | 3179-6 | Q Maint |
| 476 | 3179-6 | Q Maint |
| 476 | 3179-6 | Weld deck |
| 476 | 3179-6 | Weld seat |
| 476 | 3281-6 | Repair steering |
| 476 | 3281-6 | Replace camper thrust |
| 476 | 3281-6 | Replace turnbuckle |
| 476 | 3281-6 | Rpl Turnbuckle/Thrust |
| 476 | 3343-6 | Adjust carburetor |
| 476 | 3343-6 | Q Maint |
| 476 | 3343-6 | Q Maint |
| 476 | 3343-6 | Repair deck arm |
| 476 | 3343-6 | Repair tire |
| 476 | 3343-6 | Replace lock link |
| 476 | 3343-6 | Replace lock pin |
| 476 | 3343-6 | Replace spring |
| 476 | 3388-6 | Repair ground wire |
| 476 | 3388-6 | Rpr Ground Wire |

| FE# | DOC # | DESCRIPTION |
|-----|--------|--------------------------------|
| 476 | 3513-6 | Rebuild Engine |
| 476 | 3513-6 | Rebuild engine |
| 476 | 3513-6 | Repair tire |
| 476 | 3786-6 | Replace oil switch |
| 476 | 3786-6 | Rpl Oil Switch |
| 476 | 3791-6 | Repair tire |
| 476 | 3791-6 | Rpr Tire |
| 476 | 3806-6 | Replace regulator |
| 476 | 3806-6 | Rpl Regulator/Weld Deck |
| 476 | 3806-6 | Troubleshoot |
| 476 | 3806-6 | Weld deck |
| 476 | 3825-6 | Repair regulator wires |
| 476 | 3825-6 | Replace blade |
| 476 | 3825-6 | Replace spark plug |
| 476 | 3825-6 | Replace tail wheel caster fork |
| 476 | 3825-6 | Service Call |
| 476 | 3825-6 | Service Call |
| 476 | 3955-6 | Adjust carburetor |
| 476 | 3955-6 | Adjust steering |
| 476 | 3955-6 | Q Maint |
| 476 | 3955-6 | Q Maint |
| 476 | 3955-6 | Replace belts |
| 476 | 3955-6 | Replace regulator |
| 476 | 3955-6 | Replace turnbuckle |
| 476 | 3955-6 | Replace washer |
| 476 | 3955-6 | Weld deck |

APPENDIX E: SUMMARY DATA TABLES

Table E1

Breakdown of Service Visits

| Data Files | Service Visits | | | | Repair Tasks | |
|------------|----------------|------------|--------------|---------------------|--------------|---------------|
| | Total Visits | Unit Only | Support Only | Both Unit & Support | Unit Tasks | Support Tasks |
| 1 | 906 | 686 | 46 | 174 | 2,436 | 387 |
| 2 | 1,047 | 753 | 51 | 243 | 3,099 | 636 |
| 3 | 767 | 560 | 26 | 181 | 3,078 | 517 |
| 4 | 859 | 613 | 30 | 216 | 3,201 | 615 |
| 5 | <u>361</u> | <u>250</u> | <u>12</u> | <u>99</u> | <u>1,393</u> | <u>247</u> |
| | 3,940 | 2,862 | 165 | 913 | 13,207 | 2,402 |

Table E2

Vehicle Maintenance Labor Hours and Costs for Fort Riley, KS (1986)

| FILE NAME | UNIT LABOR HOURS | SUPPORT LABOR HOURS | TOTAL LABOR HOURS | UNIT LABOR DOLLARS | | SUPPORT LABOR DOLLARS | | TOTAL ADJ LABOR DOLLARS |
|--------------|---------------------|------------------------|----------------------|--------------------|-----------|-----------------------|-----------|-------------------------------|
| | | | | UNADJ | ADJUSTED | UNADJ | ADJUSTED | |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| #2_ORG_M | 1,583.93 | 514.60 | 2,098.53 | \$26,490 | \$26,547 | \$8,625 | \$8,625 | \$35,171 |
| #3_ORG_M | 547.50 | 260.40 | 807.90 | \$9,192 | \$9,176 | \$4,365 | \$4,364 | \$13,540 |
| BECKY_OR | 1,410.00 | 585.20 | 1,995.20 | \$99 | \$23,632 | \$0 | \$9,808 | \$33,440 |
| C_ORG_MA | 951.60 | 509.80 | 1,461.40 | \$9 | \$15,949 | \$0 | \$8,544 | \$24,493 |
| D_ORG_MA | 984.80 | 457.50 | 1,442.30 | \$437 | \$16,505 | \$14 | \$7,668 | \$24,173 |
| E_ORG_MA | 525.50 | 258.85 | 784.35 | \$5 | \$8,807 | \$6 | \$4,338 | \$13,146 |
| F_ORG_MA | 402.90 | 252.70 | 655.60 | \$44 | \$6,753 | \$7 | \$4,235 | \$10,988 |
| G_ORG_MA | 494.89 | 176.50 | 671.39 | \$150 | \$8,294 | \$0 | \$2,958 | \$11,252 |
| H_ORG_MA | 514.00 | 271.49 | 785.49 | \$0 | \$8,615 | \$0 | \$4,550 | \$13,165 |
| I_ORG_MA | 582.95 | 79.50 | 662.45 | \$0 | \$9,770 | \$0 | \$1,332 | \$11,103 |
| J_ORG_MA | 478.10 | 228.90 | 707.00 | \$0 | \$8,013 | \$0 | \$3,836 | \$11,849 |
| K_ORG_MA | 510.00 | 433.60 | 943.60 | \$0 | \$8,548 | \$0 | \$7,267 | \$15,815 |
| L_ORG_MA | 545.10 | 282.00 | 827.10 | \$3 | \$9,136 | \$76 | \$4,726 | \$13,862 |
| MAIN1 | 4,050.60 | 597.30 | 4,647.90 | \$73,057 | \$67,888 | \$10,011 | \$10,011 | \$77,899 |
| MAIN2 | 1,389.40 | 605.80 | 1,995.20 | \$99 | \$23,286 | \$0 | \$10,153 | \$33,440 |
| MAIN3 | 1,023.00 | 478.60 | 1,501.60 | \$60 | \$17,145 | \$620 | \$8,021 | \$25,167 |
| M_ORG_MA | 532.57 | 141.70 | 674.27 | \$28 | \$8,926 | \$0 | \$2,375 | \$11,301 |
| G_ORG | 501.90 | 159.00 | 660.90 | \$8,412 | \$8,412 | \$2,638 | \$2,665 | \$11,077 |
| H_ORG | 574.90 | 189.40 | 764.30 | \$9,635 | \$9,635 | \$2,856 | \$3,174 | \$12,810 |
| I_ORG | 624.75 | 26.00 | 650.75 | \$10,533 | \$10,471 | \$436 | \$436 | \$10,907 |
| J_ORG_OR | 566.00 | 145.50 | 711.50 | \$9,486 | \$9,486 | \$2,439 | \$2,439 | \$11,925 |
| K_ORG_OR | 664.80 | 277.80 | 942.60 | \$11,159 | \$11,142 | \$4,656 | \$4,656 | \$15,798 |
| L_ORG_OR | 645.60 | 181.50 | 827.10 | \$10,820 | \$10,820 | \$3,042 | \$3,042 | \$13,862 |
| L_ORG_MA | 2.00 | 0.00 | 2.00 | \$0 | \$34 | \$0 | \$0 | \$34 |
| M_ORG_OR | 516.77 | 157.50 | 674.27 | \$8,661 | \$8,661 | \$2,640 | \$2,640 | \$11,301 |
| M_ORG_MA | 517.57 | 157.20 | 674.77 | \$0 | \$8,674 | \$0 | \$2,635 | \$11,309 |
| N_ORG_OR | 612.80 | 41.00 | 653.80 | \$10,271 | \$10,271 | \$687 | \$687 | \$10,958 |
| N_ORG_MA | 477.80 | 167.00 | 644.80 | \$0 | \$8,008 | \$0 | \$2,799 | \$10,807 |
| O_ORG_MA | 615.70 | 148.50 | 764.20 | \$0 | \$10,319 | \$0 | \$2,489 | \$12,808 |
| O_ORG_OR | 682.70 | 79.50 | 762.20 | \$11,442 | \$11,442 | \$1,332 | \$1,332 | \$12,774 |
| P_ORG_M | 448.70 | 243.00 | 691.70 | \$0 | \$7,520 | \$0 | \$4,073 | \$11,593 |
| P_ORG_OR | 556.90 | 130.30 | 687.20 | \$9,334 | \$9,334 | \$2,184 | \$2,184 | \$11,517 |
| Q_ORG_OR | 268.50 | 1.30 | 269.80 | \$4,433 | \$4,500 | \$22 | \$22 | \$4,522 |
| Q_ORG_MA | 240.00 | 25.80 | 265.80 | \$0 | \$4,022 | \$0 | \$432 | \$4,455 |
| ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- | ----- |
| | 25,044.23 | 8,264.74 | 33,308.97 | \$213,857 | \$419,741 | \$46,654 | \$138,517 | \$558,258 |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| | | | | 50.95% | | 33.68% | | |
| | | | | | 75.19% | | 24.81% | 100.00% |

UNADJUSTED AS A PERCENT OF ADJUSTED
ACTUAL AS A PERCENT OF TOTAL

Table E3

**Vehicle Maintenance Parts and Labor Dollars and
Labor Hours for Fort Riley, KS (1986)**

| FILE NAME | PARTS DOLLARS | | | LABOR HOURS | | | LABOR DOLLARS | | |
|--------------|---------------|-----------|-----------|-------------|---------|--------|---------------|-----------|-----------|
| | UNIT | SUPPORT | TOTAL | UNIT | SUPPORT | TOTAL | UNIT | SUPPORT | TOTAL |
| #2_ORG_M | \$34,870 | \$16,561 | \$51,432 | 1,584 | 515 | 2,099 | \$26,547 | \$8,625 | \$35,171 |
| #3_ORG_M | \$8,576 | \$3,477 | \$12,054 | 548 | 260 | 808 | \$9,176 | \$4,364 | \$13,540 |
| BECKY-OR | \$43,260 | \$27,081 | \$70,340 | 1,410 | 585 | 1,995 | \$23,632 | \$9,808 | \$33,440 |
| C_ORG_MA | \$15,749 | \$9,439 | \$25,187 | 952 | 510 | 1,461 | \$15,949 | \$8,544 | \$24,493 |
| D_ORG_MA | \$19,023 | \$21,896 | \$40,919 | 985 | 458 | 1,442 | \$16,505 | \$7,668 | \$24,173 |
| E_ORG_MA | \$5,792 | \$6,621 | \$12,412 | 526 | 259 | 784 | \$8,807 | \$4,338 | \$13,146 |
| F_ORG_MA | \$4,137 | \$5,394 | \$9,531 | 403 | 253 | 656 | \$6,753 | \$4,235 | \$10,988 |
| G_ORG_MA | \$6,676 | \$3,318 | \$9,993 | 495 | 177 | 671 | \$8,294 | \$2,958 | \$11,252 |
| H_ORG_MA | \$4,873 | \$2,898 | \$7,772 | 514 | 271 | 785 | \$8,615 | \$4,550 | \$13,165 |
| I_ORG_MA | \$6,437 | \$1,973 | \$8,410 | 583 | 80 | 662 | \$9,770 | \$1,332 | \$11,103 |
| J_ORG_MA | \$5,957 | \$7,497 | \$13,454 | 478 | 229 | 707 | \$8,013 | \$3,836 | \$11,849 |
| K_ORG_MA | \$8,783 | \$13,438 | \$22,221 | 510 | 434 | 944 | \$8,548 | \$7,267 | \$15,815 |
| L_ORG_MA | \$6,649 | \$7,016 | \$13,665 | 545 | 282 | 827 | \$9,136 | \$4,726 | \$13,862 |
| MAIN1 | \$106,501 | \$27,894 | \$134,395 | 4,051 | 597 | 4,648 | \$67,888 | \$10,011 | \$77,899 |
| MAIN2 | \$42,344 | \$27,997 | \$70,340 | 1,389 | 606 | 1,995 | \$23,286 | \$10,153 | \$33,440 |
| MAIN3 | \$16,356 | \$21,822 | \$38,178 | 1,023 | 479 | 1,502 | \$17,145 | \$8,021 | \$25,167 |
| M_ORG_MA | \$7,220 | \$4,447 | \$11,668 | 533 | 142 | 674 | \$8,926 | \$2,375 | \$11,301 |
| G_-ORG | \$6,311 | \$3,767 | \$10,078 | 502 | 159 | 661 | \$8,412 | \$2,665 | \$11,077 |
| H_-ORG | \$5,121 | \$2,902 | \$8,023 | 575 | 189 | 764 | \$9,635 | \$3,174 | \$12,810 |
| I_-ORG | \$7,847 | \$505 | \$8,352 | 625 | 26 | 651 | \$10,471 | \$436 | \$10,907 |
| J_-OM_OR | \$7,743 | \$1,942 | \$9,685 | 566 | 146 | 712 | \$9,486 | \$2,439 | \$11,925 |
| K_-OM_OR | \$8,869 | \$3,482 | \$12,352 | 665 | 278 | 943 | \$11,142 | \$4,656 | \$15,798 |
| L_-OM_OR | \$8,086 | \$5,639 | \$13,725 | 646 | 182 | 827 | \$10,820 | \$3,042 | \$13,862 |
| L_ORG_MA | \$0 | \$0 | \$0 | 2 | 0 | 2 | \$34 | \$0 | \$34 |
| M_-OM_OR | \$5,587 | \$1,505 | \$7,092 | 517 | 158 | 674 | \$8,661 | \$2,640 | \$11,301 |
| M_ORG_MA | \$7,481 | \$4,214 | \$11,695 | 518 | 157 | 675 | \$8,674 | \$2,635 | \$11,309 |
| N_-OM_OR | \$6,702 | \$258 | \$6,960 | 613 | 41 | 654 | \$10,271 | \$687 | \$10,958 |
| N_ORG_MA | \$4,944 | \$4,159 | \$9,103 | 478 | 167 | 645 | \$8,008 | \$2,799 | \$10,807 |
| O_ORG_MA | \$6,292 | \$2,114 | \$8,406 | 616 | 149 | 764 | \$10,319 | \$2,489 | \$12,808 |
| O_-OM_OR | \$7,932 | \$644 | \$8,576 | 683 | 80 | 762 | \$11,442 | \$1,332 | \$12,774 |
| P_ORG_M | \$4,955 | \$12,570 | \$17,525 | 449 | 243 | 692 | \$7,520 | \$4,073 | \$11,593 |
| P_-OM | \$10,689 | \$2,929 | \$13,618 | 557 | 130 | 687 | \$9,334 | \$2,184 | \$11,517 |
| Q_ORG_ORG | \$4,094 | \$0 | \$4,094 | 269 | 1 | 270 | \$4,500 | \$22 | \$4,522 |
| Q_ORG_MA | \$3,607 | \$488 | \$4,094 | 240 | 26 | 266 | \$4,022 | \$432 | \$4,455 |
| ===== | | | | | | | | | |
| | \$449,465 | \$255,887 | \$705,352 | 25,044 | 8,265 | 33,309 | \$419,741 | \$138,517 | \$558,258 |
| ===== | | | | | | | | | |
| | 64% | 36% | 100% | 75% | 25% | 100% | 75% | 25% | 100% |

PERCENT OF TOTAL

Table E4

Vehicle Maintenance Unit and Support Costs for Fort Riley, KS (1986)

| FILE NAME | UNIT | | | SUPPORT | | | TOTAL UNIT & SUPPORT \$ |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-------------------------------|
| | PARTS \$ | LABOR \$ | TOTAL \$ | PARTS \$ | LABOR \$ | TOTAL \$ | |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| #2_ORG_M | \$34,870 | \$26,547 | \$61,417 | \$16,561 | \$8,625 | \$25,186 | \$86,603 |
| #3_ORG_M | \$8,576 | \$9,176 | \$17,753 | \$3,477 | \$4,364 | \$7,842 | \$25,594 |
| BECKY-OR | \$43,260 | \$23,632 | \$66,891 | \$27,081 | \$9,808 | \$36,889 | \$103,780 |
| C_ORG_MA | \$15,749 | \$15,949 | \$31,698 | \$9,439 | \$8,544 | \$17,983 | \$49,680 |
| D_ORG_MA | \$19,023 | \$16,505 | \$35,528 | \$21,896 | \$7,668 | \$29,564 | \$65,092 |
| E_ORG_MA | \$5,792 | \$8,807 | \$14,599 | \$6,621 | \$4,338 | \$10,959 | \$25,558 |
| F_ORG_MA | \$4,137 | \$6,753 | \$10,890 | \$5,394 | \$4,235 | \$9,629 | \$20,519 |
| G_ORG_MA | \$6,676 | \$8,294 | \$14,970 | \$3,318 | \$2,958 | \$6,276 | \$21,246 |
| H_ORG_MA | \$4,873 | \$8,615 | \$13,488 | \$2,898 | \$4,550 | \$7,448 | \$20,936 |
| I_ORG_MA | \$6,437 | \$9,770 | \$16,207 | \$1,973 | \$1,332 | \$3,306 | \$19,512 |
| J_ORG_MA | \$5,957 | \$8,013 | \$13,970 | \$7,497 | \$3,836 | \$11,334 | \$25,303 |
| K_ORG_MA | \$8,783 | \$8,548 | \$17,331 | \$13,438 | \$7,267 | \$20,705 | \$38,036 |
| L_ORG_MA | \$6,649 | \$9,136 | \$15,785 | \$7,016 | \$4,726 | \$11,743 | \$27,528 |
| MAIN1 | \$106,501 | \$67,888 | \$174,390 | \$27,894 | \$10,011 | \$37,905 | \$212,294 |
| MAIN2 | \$42,344 | \$23,286 | \$65,630 | \$27,997 | \$10,153 | \$38,150 | \$103,780 |
| MAIN3 | \$16,356 | \$17,145 | \$33,502 | \$21,822 | \$8,021 | \$29,843 | \$63,345 |
| M_ORG_MA | \$7,220 | \$8,926 | \$16,146 | \$4,447 | \$2,375 | \$6,822 | \$22,968 |
| G_ORG | \$6,311 | \$8,412 | \$14,722 | \$3,767 | \$2,665 | \$6,432 | \$21,155 |
| H_ORG | \$5,121 | \$9,635 | \$14,757 | \$2,902 | \$3,174 | \$6,076 | \$20,833 |
| I_ORG | \$7,847 | \$10,471 | \$18,318 | \$505 | \$436 | \$941 | \$19,259 |
| J_ORG | \$7,743 | \$9,486 | \$17,229 | \$1,942 | \$2,439 | \$4,381 | \$21,610 |
| K_ORG | \$8,869 | \$11,142 | \$20,011 | \$3,482 | \$4,656 | \$8,138 | \$28,150 |
| L_ORG | \$8,086 | \$10,820 | \$18,906 | \$5,639 | \$3,042 | \$8,681 | \$27,587 |
| L_ORG_MA | \$0 | \$34 | \$34 | \$0 | \$0 | \$0 | \$34 |
| M_ORG | \$5,587 | \$8,661 | \$14,248 | \$1,505 | \$2,640 | \$4,145 | \$18,393 |
| M_ORG_MA | \$7,481 | \$8,674 | \$16,156 | \$4,214 | \$2,635 | \$6,848 | \$23,004 |
| N_ORG | \$6,702 | \$10,271 | \$16,973 | \$258 | \$687 | \$945 | \$17,918 |
| N_ORG_MA | \$4,944 | \$8,008 | \$12,952 | \$4,159 | \$2,799 | \$6,958 | \$19,910 |
| O_ORG_MA | \$6,292 | \$10,319 | \$16,612 | \$2,114 | \$2,489 | \$4,603 | \$21,214 |
| O_ORG | \$7,932 | \$11,442 | \$19,374 | \$644 | \$1,332 | \$1,976 | \$21,350 |
| P_ORG_M | \$4,955 | \$7,520 | \$12,476 | \$12,570 | \$4,073 | \$16,643 | \$29,118 |
| P_ORG | \$10,689 | \$9,334 | \$20,023 | \$2,929 | \$2,184 | \$5,113 | \$25,135 |
| Q_ORG_ORG | \$4,094 | \$4,500 | \$8,594 | \$0 | \$22 | \$22 | \$8,616 |
| Q_ORG_MA | \$3,607 | \$4,022 | \$7,629 | \$488 | \$432 | \$920 | \$8,549 |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |
| | \$449,465 | \$419,741 | \$869,207 | \$255,887 | \$138,517 | \$394,404 | \$1,263,610 |
| ===== | ===== | ===== | ===== | ===== | ===== | ===== | ===== |

68.79%

31.21%

ACTUAL AS A PERCENT OF TOTAL

Table E5

Reconstruction of TAMMS Process Costs

| Step* | Item | Value | Source |
|-------|---|-----------|------------|
| 4. | Unit repair cases | 2,862 | [Table E1] |
| | Inspection hours per repair** | x 1.5 | |
| | Total unit inspection hours | 4293 | |
| | Labor rate*** | x \$16.76 | |
| | | \$71,951 | |
| 5. | Unit repair and inspection hours | 419,741 | [Table E4] |
| | Total unit repair hours less inspection time percentage based on 6 day survey (100 - 4.75) | 95.25% | [Table E7] |
| | | 399,803 | |
| 6. | Value in "4" above | 71,951 | |
| | Value in "5" above | 399,803 | |
| | Total unit repairs | 471,754 | |
| 7. | Support only plus both support and unit repair cases | 1,078 | [Table E1] |
| | Inspection hours per repair | 2 | |
| | Total support inspection hours | 2,156 | |
| | Labor rate | x \$16.76 | |
| | | \$36,136 | |
| 8. | Support repair and inspection hours | 138,517 | [Table E4] |
| | Total support repair hours less inspection time percentage based on six day survey (100 - 0.91) | 9.09% | [Table E7] |
| | | 137,256 | |
| 9. | Value in "7" above | 36,135 | |
| | Value in "8" above | 137,256 | |
| | Total support repairs | 173,391 | |

*Step number corresponds to the steps outlined in Chapter 2.

**"Inspection hour" as previously defined.

***"Labor rate" as previously defined.

Table E6

Comparison of Service Writer and TAMMS Process Costs

| Service Writer Process | Labor Only | Parts | Parts & Labor |
|--|-------------------|--------------|--------------------------|
| Total annual cost of mechanic repair and inspection time unit level cases (from Table 5) | 419,741 | 449,465 | 869,207 |
| Support level cases (from Table 5) | 138,517 | 255,887 | 394,404 |
| Total all cases | 558,258 | 705,352 | 1,263,610 |
| TAMMS Process | | | |
| Total annual cost of unit level costs (from Table 7) | | | |
| Inspection | 71,951 | | |
| Repairs | 399,803 | | |
| Total unit level | 471,754 | | |
| Total annual cost of support level costs (from Table 7) | | | |
| Inspection | 36,135 | | |
| Repairs | 137,256 | | |
| Total support level | 173,391 | | |
| Total unit and support costs | 645,145 | 705,352 | 1,350,497 |
| TAMMS Process less Service Writer Process | 86,887 | | 86,887 |
| Percent Savings | 13.5% | | 6.4% |

Table E7

**Analysis of Time-In-Motion Observations By Repair Type
And Type Of Maintenance Action**

| Description of Value | Comments | Pro- ductive | Non- productive | Indirect Productive | Total Time | Inspection* Time |
|--|-------------------|-------------------------|----------------------------|--------------------------------|-----------------------|-----------------------------|
| Total Time, by Component (%) | Unit + Support | 55.56 | 32.26 | 11.94 | 100.00 | 3.51 |
| Total Support (Hours) | Support | 17.13 | 9.25 | 3.20 | 29.77 | 0.27 |
| Support Time, by Component (%) | Support | 57.55 | 31.08 | 10.74 | 100.00 | 0.91 |
| Total Unit (Hours) | Unit | 34.18 | 20.54 | 7.82 | 62.58 | 2.97 |
| Unit Time, by Component (%) | Unit | 54.62 | 32.82 | 12.50 | 100.00 | 4.75 |
| Unit as a Percent of Total Time (%) | | 66.61 | 68.94 | 70.98 | 67.76 | 91.66 |

*Inspection time is included with productive time.

Table E8

Summary of Time-And-Motion Study

| | Productive | | Nonproductive | Indirect Productive | Total Time |
|--------------|-------------------|--------------|----------------------|----------------------------|-----------------------|
| | Inspection | Other | | | |
| All Repairs* | 4** | 52 | 32 | 12 | 100 |
| Unit | 1 | 50 | 33 | 12 | 100 |
| Support | 1 | 57 | 31 | 11 | 100 |

*All repairs are a weighted average of unit and support level maintenance cases.

**Values are percentages.

**APPENDIX F: JOB FREQUENCY BY VEHICLE NUMBER AND
NUMBER OF JOBS PERFORMED**

| Sorted by Vehicle # | | Sorted by Number of Jobs Performed | |
|---------------------|-----------|------------------------------------|-----------|
| FE# | # of Jobs | FE# | # of Jobs |
| 1 | 157 | 59 | 2 |
| 2 | 188 | 71 | 2 |
| 3 | 89 | 74 | 2 |
| 4 | 63 | 103 | 2 |
| 6 | 121 | 118 | 2 |
| 8 | 5 | 141 | 2 |
| 9 | 270 | 153 | 2 |
| 10 | 191 | 163 | 2 |
| 11 | 81 | 204 | 2 |
| 12 | 12 | 239 | 2 |
| 13 | 129 | 490 | 2 |
| 14 | 108 | 503 | 2 |
| 15 | 261 | 73 | 3 |
| 16 | 41 | 92 | 3 |
| 17 | 59 | 117 | 3 |
| 18 | 247 | 137 | 3 |
| 19 | 152 | 139 | 3 |
| 20 | 39 | 240 | 3 |
| 23 | 57 | 311 | 3 |
| 24 | 182 | 344 | 3 |
| 25 | 146 | 345 | 3 |
| 27 | 66 | 346 | 3 |
| 28 | 53 | 347 | 3 |
| 29 | 36 | 348 | 3 |
| 30 | 8 | 66 | 4 |
| 31 | 35 | 67 | 4 |
| 32 | 68 | 76 | 4 |
| 33 | 64 | 130 | 4 |
| 34 | 68 | 135 | 4 |
| 35 | 54 | 136 | 4 |
| 36 | 10 | 140 | 4 |
| 37 | 47 | 143 | 4 |
| 38 | 10 | 223 | 4 |
| 39 | 104 | 227 | 4 |
| 40 | 45 | 232 | 4 |
| 41 | 38 | 502 | 4 |
| 42 | 43 | 8 | 4 |
| 43 | 61 | 119 | 4 |
| 44 | 85 | 157 | 4 |
| 46 | 56 | 160 | 4 |
| 47 | 48 | 222 | 4 |
| 48 | 39 | 235 | 4 |
| 49 | 57 | 69 | 4 |
| 50 | 33 | 75 | 4 |
| 51 | 23 | 80 | 4 |
| 52 | 44 | 88 | 4 |
| 53 | 8 | 110 | 4 |
| 54 | 57 | 111 | 4 |
| 55 | 84 | 176 | 4 |
| 56 | 54 | 205 | 4 |
| 57 | 32 | 231 | 4 |
| 59 | 2 | 441 | 4 |
| 60 | 47 | 475 | 4 |
| 61 | 105 | 491 | 4 |
| 62 | 58 | 72 | 4 |
| 63 | 26 | 87 | 4 |
| 64 | 16 | 116 | 4 |
| 66 | 4 | 125 | 4 |
| 67 | 4 | 159 | 4 |
| 68 | 9 | 165 | 4 |
| 69 | 6 | 220 | 4 |
| 71 | 2 | 388 | 4 |
| 72 | 7 | 453 | 4 |
| 73 | 3 | 472 | 4 |
| 74 | 2 | 488 | 4 |
| 75 | 6 | 30 | 4 |

| Sorted by Vehicle # | | Sorted by Number of Jobs Performed | |
|---------------------|-----------|------------------------------------|-----------|
| FE# | # of Jobs | FE# | # of Jobs |
| 76 | 4 | 53 | 8 |
| 80 | 6 | 81 | 8 |
| 81 | 8 | 83 | 8 |
| 82 | 14 | 86 | 8 |
| 83 | 8 | 134 | 8 |
| 85 | 26 | 152 | 8 |
| 86 | 8 | 190 | 8 |
| 87 | 7 | 213 | 8 |
| 88 | 6 | 291 | 8 |
| 89 | 13 | 332 | 8 |
| 92 | 3 | 377 | 8 |
| 93 | 16 | 437 | 8 |
| 101 | 79 | 470 | 8 |
| 102 | 55 | 484 | 8 |
| 103 | 2 | 485 | 8 |
| 104 | 52 | 487 | 8 |
| 106 | 63 | 68 | 9 |
| 107 | 91 | 115 | 9 |
| 108 | 50 | 158 | 9 |
| 109 | 14 | 166 | 9 |
| 110 | 6 | 171 | 9 |
| 111 | 6 | 177 | 9 |
| 112 | 11 | 283 | 9 |
| 113 | 28 | 336 | 9 |
| 114 | 13 | 426 | 9 |
| 115 | 9 | 473 | 9 |
| 116 | 7 | 36 | 10 |
| 117 | 3 | 38 | 10 |
| 118 | 2 | 225 | 10 |
| 119 | 5 | 289 | 10 |
| 120 | 101 | 308 | 10 |
| 121 | 73 | 424 | 10 |
| 122 | 80 | 439 | 10 |
| 123 | 80 | 459 | 10 |
| 124 | 13 | 489 | 10 |
| 125 | 7 | 112 | 11 |
| 126 | 54 | 132 | 11 |
| 127 | 62 | 219 | 11 |
| 130 | 4 | 230 | 11 |
| 131 | 20 | 253 | 11 |
| 132 | 11 | 273 | 11 |
| 133 | 13 | 282 | 11 |
| 134 | 8 | 287 | 11 |
| 135 | 4 | 288 | 11 |
| 136 | 4 | 417 | 11 |
| 137 | 3 | 444 | 11 |
| 138 | 24 | 450 | 11 |
| 139 | 3 | 12 | 12 |
| 140 | 4 | 224 | 12 |
| 141 | 2 | 277 | 12 |
| 143 | 4 | 343 | 12 |
| 145 | 36 | 378 | 12 |
| 146 | 43 | 401 | 12 |
| 147 | 15 | 425 | 12 |
| 150 | 115 | 436 | 12 |
| 152 | 8 | 89 | 13 |
| 153 | 2 | 114 | 13 |
| 154 | 17 | 124 | 13 |
| 155 | 16 | 133 | 13 |
| 157 | 5 | 221 | 13 |
| 158 | 9 | 286 | 13 |
| 159 | 7 | 337 | 13 |
| 160 | 5 | 427 | 13 |
| 161 | 18 | 474 | 13 |
| 162 | 26 | 481 | 13 |
| 163 | 2 | 82 | 14 |

Job Frequency

Job Frequency

| Sorted by Vehicle # | | Sorted by Number of Jobs Performed | |
|---------------------|-----------|------------------------------------|-----------|
| FE# | # of Jobs | FE# | # of Jobs |
| 165 | 7 | 109 | 14 |
| 166 | 9 | 292 | 14 |
| 170 | 18 | 329 | 14 |
| 171 | 9 | 385 | 14 |
| 176 | 6 | 438 | 14 |
| 177 | 9 | 147 | 15 |
| 178 | 60 | 290 | 15 |
| 179 | 111 | 300 | 15 |
| 180 | 58 | 307 | 15 |
| 181 | 69 | 419 | 15 |
| 182 | 109 | 429 | 15 |
| 183 | 137 | 460 | 15 |
| 184 | 158 | 461 | 15 |
| 185 | 114 | 462 | 15 |
| 186 | 132 | 64 | 16 |
| 187 | 117 | 93 | 16 |
| 188 | 50 | 155 | 16 |
| 189 | 56 | 294 | 16 |
| 190 | 8 | 430 | 16 |
| 191 | 92 | 431 | 16 |
| 192 | 43 | 454 | 16 |
| 193 | 35 | 154 | 17 |
| 194 | 95 | 247 | 17 |
| 195 | 34 | 257 | 17 |
| 196 | 27 | 293 | 17 |
| 198 | 48 | 381 | 17 |
| 202 | 30 | 161 | 18 |
| 204 | 2 | 170 | 18 |
| 205 | 6 | 280 | 18 |
| 213 | 8 | 312 | 18 |
| 219 | 11 | 316 | 18 |
| 220 | 7 | 321 | 18 |
| 221 | 13 | 386 | 18 |
| 222 | 5 | 248 | 19 |
| 223 | 4 | 275 | 19 |
| 224 | 12 | 357 | 19 |
| 225 | 10 | 370 | 19 |
| 226 | 21 | 380 | 19 |
| 227 | 4 | 387 | 19 |
| 230 | 11 | 440 | 19 |
| 231 | 6 | 452 | 19 |
| 232 | 4 | 131 | 20 |
| 235 | 5 | 414 | 20 |
| 239 | 2 | 421 | 20 |
| 240 | 3 | 451 | 20 |
| 245 | 62 | 466 | 20 |
| 246 | 21 | 483 | 20 |
| 247 | 17 | 226 | 21 |
| 248 | 19 | 246 | 21 |
| 249 | 32 | 252 | 21 |
| 250 | 36 | 308 | 21 |
| 251 | 23 | 323 | 21 |
| 252 | 21 | 330 | 21 |
| 253 | 11 | 342 | 21 |
| 254 | 36 | 382 | 21 |
| 255 | 23 | 415 | 21 |
| 256 | 34 | 464 | 21 |
| 257 | 17 | 467 | 21 |
| 258 | 30 | 469 | 21 |
| 259 | 25 | 383 | 22 |
| 260 | 32 | 455 | 22 |
| 262 | 33 | 468 | 22 |
| 263 | 63 | 51 | 23 |
| 264 | 30 | 251 | 23 |
| 265 | 30 | 255 | 23 |
| 266 | 63 | 267 | 23 |

| Sorted by Vehicle # | | Sorted by Number of Jobs Performed | |
|---------------------|-----------|------------------------------------|-----------|
| FE# | # of Jobs | FE# | # of Jobs |
| 267 | 23 | 281 | 23 |
| 268 | 63 | 501 | 23 |
| 273 | 11 | 138 | 24 |
| 274 | 24 | 274 | 24 |
| 275 | 19 | 276 | 24 |
| 276 | 24 | 309 | 24 |
| 277 | 12 | 410 | 24 |
| 278 | 27 | 433 | 24 |
| 279 | 26 | 259 | 25 |
| 280 | 18 | 465 | 25 |
| 281 | 23 | 63 | 26 |
| 282 | 11 | 85 | 26 |
| 283 | 9 | 162 | 26 |
| 284 | 36 | 279 | 26 |
| 286 | 13 | 317 | 26 |
| 287 | 11 | 324 | 26 |
| 288 | 11 | 334 | 26 |
| 289 | 10 | 373 | 26 |
| 290 | 15 | 447 | 26 |
| 291 | 8 | 482 | 26 |
| 292 | 14 | 196 | 27 |
| 293 | 17 | 278 | 27 |
| 294 | 16 | 310 | 27 |
| 296 | 83 | 384 | 27 |
| 300 | 15 | 400 | 27 |
| 301 | 63 | 416 | 27 |
| 302 | 31 | 418 | 27 |
| 303 | 46 | 432 | 27 |
| 305 | 153 | 457 | 27 |
| 306 | 29 | 113 | 28 |
| 307 | 15 | 327 | 28 |
| 308 | 21 | 423 | 28 |
| 308 | 10 | 446 | 28 |
| 309 | 24 | 306 | 29 |
| 310 | 27 | 319 | 29 |
| 311 | 3 | 202 | 30 |
| 312 | 18 | 258 | 30 |
| 313 | 45 | 264 | 30 |
| 314 | 47 | 265 | 30 |
| 315 | 34 | 445 | 30 |
| 316 | 18 | 448 | 30 |
| 317 | 26 | 302 | 31 |
| 318 | 39 | 320 | 31 |
| 319 | 29 | 358 | 31 |
| 320 | 31 | 369 | 31 |
| 321 | 18 | 407 | 31 |
| 322 | 38 | 57 | 32 |
| 323 | 21 | 249 | 32 |
| 324 | 26 | 260 | 32 |
| 325 | 38 | 471 | 32 |
| 326 | 34 | 50 | 33 |
| 327 | 28 | 262 | 33 |
| 328 | 40 | 356 | 33 |
| 329 | 14 | 195 | 34 |
| 330 | 21 | 256 | 34 |
| 331 | 58 | 315 | 34 |
| 332 | 8 | 326 | 34 |
| 333 | 43 | 493 | 34 |
| 334 | 26 | 497 | 34 |
| 336 | 9 | 31 | 35 |
| 337 | 13 | 193 | 35 |
| 339 | 53 | 428 | 35 |
| 340 | 50 | 29 | 36 |
| 341 | 94 | 145 | 36 |
| 342 | 21 | 250 | 36 |
| 343 | 12 | 254 | 36 |

Job Frequency

| Sorted by Vehicle # | | Sorted by Number of Jobs Performed | |
|---------------------|-----------|------------------------------------|-----------|
| FE# | # of Jobs | FE# | # of Jobs |
| 344 | 3 | 284 | 36 |
| 345 | 3 | 403 | 36 |
| 346 | 3 | 495 | 36 |
| 347 | 3 | 496 | 36 |
| 348 | 3 | 449 | 37 |
| 349 | 166 | 41 | 38 |
| 350 | 112 | 322 | 38 |
| 351 | 129 | 325 | 38 |
| 352 | 53 | 20 | 39 |
| 353 | 92 | 48 | 39 |
| 354 | 112 | 318 | 39 |
| 356 | 33 | 498 | 39 |
| 357 | 19 | 328 | 40 |
| 358 | 31 | 379 | 40 |
| 359 | 140 | 408 | 40 |
| 360 | 131 | 16 | 41 |
| 361 | 72 | 422 | 41 |
| 364 | 46 | 456 | 41 |
| 365 | 243 | 42 | 43 |
| 366 | 109 | 146 | 43 |
| 367 | 286 | 192 | 43 |
| 368 | 44 | 333 | 43 |
| 369 | 31 | 52 | 44 |
| 370 | 19 | 368 | 44 |
| 371 | 44 | 371 | 44 |
| 372 | 46 | 463 | 44 |
| 373 | 26 | 492 | 44 |
| 374 | 47 | 494 | 44 |
| 375 | 193 | 40 | 45 |
| 376 | 55 | 313 | 45 |
| 377 | 8 | 420 | 45 |
| 378 | 12 | 303 | 46 |
| 379 | 40 | 364 | 46 |
| 380 | 19 | 372 | 46 |
| 381 | 17 | 37 | 47 |
| 382 | 21 | 60 | 47 |
| 383 | 22 | 314 | 47 |
| 384 | 27 | 374 | 47 |
| 385 | 14 | 47 | 48 |
| 386 | 18 | 198 | 48 |
| 387 | 19 | 396 | 48 |
| 388 | 7 | 413 | 48 |
| 389 | 84 | 435 | 48 |
| 390 | 90 | 108 | 50 |
| 391 | 178 | 188 | 50 |
| 392 | 116 | 340 | 50 |
| 393 | 197 | 399 | 51 |
| 394 | 65 | 458 | 51 |
| 395 | 83 | 104 | 52 |
| 396 | 48 | 28 | 53 |
| 397 | 123 | 339 | 53 |
| 398 | 83 | 352 | 53 |
| 399 | 51 | 499 | 53 |
| 400 | 27 | 35 | 54 |
| 401 | 12 | 56 | 54 |
| 403 | 36 | 126 | 54 |
| 405 | 74 | 434 | 54 |
| 406 | 128 | 102 | 55 |
| 407 | 31 | 376 | 55 |
| 408 | 40 | 500 | 55 |
| 410 | 24 | 46 | 56 |
| 411 | 61 | 189 | 56 |
| 413 | 48 | 23 | 57 |
| 414 | 20 | 49 | 57 |
| 415 | 21 | 54 | 57 |
| 416 | 27 | 478 | 57 |

Job Frequency

| Sorted by Vehicle # | | Sorted by Number of Jobs Performed | |
|---------------------|-----------|------------------------------------|-----------|
| FE# | # of Jobs | FE# | # of Jobs |
| 417 | 11 | 62 | 58 |
| 418 | 27 | 180 | 58 |
| 419 | 15 | 331 | 58 |
| 420 | 45 | 17 | 59 |
| 421 | 20 | 178 | 60 |
| 422 | 41 | 43 | 61 |
| 423 | 28 | 411 | 61 |
| 424 | 10 | 127 | 62 |
| 425 | 12 | 245 | 62 |
| 426 | 9 | 4 | 63 |
| 427 | 13 | 106 | 63 |
| 428 | 35 | 263 | 63 |
| 429 | 15 | 266 | 63 |
| 430 | 16 | 268 | 63 |
| 431 | 16 | 301 | 63 |
| 432 | 27 | 33 | 64 |
| 433 | 24 | 394 | 65 |
| 434 | 54 | 480 | 65 |
| 435 | 48 | 27 | 66 |
| 436 | 12 | 32 | 68 |
| 437 | 8 | 34 | 68 |
| 438 | 14 | 181 | 69 |
| 439 | 10 | 361 | 72 |
| 440 | 19 | 121 | 73 |
| 441 | 6 | 405 | 74 |
| 444 | 11 | 101 | 79 |
| 445 | 30 | 122 | 80 |
| 446 | 28 | 123 | 80 |
| 447 | 26 | 11 | 81 |
| 448 | 30 | 296 | 83 |
| 449 | 37 | 395 | 83 |
| 450 | 11 | 398 | 83 |
| 451 | 20 | 55 | 84 |
| 452 | 19 | 389 | 84 |
| 453 | 7 | 44 | 85 |
| 454 | 16 | 3 | 89 |
| 455 | 22 | 390 | 90 |
| 456 | 41 | 107 | 91 |
| 457 | 27 | 191 | 92 |
| 458 | 51 | 353 | 92 |
| 459 | 10 | 341 | 94 |
| 460 | 15 | 194 | 95 |
| 461 | 15 | 120 | 101 |
| 462 | 15 | 39 | 104 |
| 463 | 44 | 61 | 105 |
| 464 | 21 | 14 | 108 |
| 465 | 25 | 182 | 109 |
| 466 | 20 | 366 | 109 |
| 467 | 21 | 179 | 111 |
| 468 | 22 | 350 | 112 |
| 469 | 21 | 354 | 112 |
| 470 | 8 | 185 | 114 |
| 471 | 32 | 150 | 115 |
| 472 | 7 | 392 | 116 |
| 473 | 9 | 187 | 117 |
| 474 | 13 | 6 | 121 |
| 475 | 6 | 397 | 123 |
| 476 | 184 | 406 | 128 |
| 477 | 153 | 13 | 129 |
| 478 | 57 | 351 | 129 |
| 479 | 183 | 360 | 131 |
| 480 | 65 | 186 | 132 |
| 481 | 13 | 183 | 137 |
| 482 | 26 | 359 | 140 |
| 483 | 20 | 25 | 146 |
| 484 | 8 | 19 | 152 |

Job Frequency

| Sorted by Vehicle # | | Sorted by Number of Jobs Performed | |
|---------------------|-----------|---------------------------------------|-----------|
| FE# | # of Jobs | FE# | # of Jobs |
| 485 | 8 | 305 | 153 |
| 487 | 8 | 477 | 153 |
| 488 | 7 | 1 | 157 |
| 489 | 10 | 184 | 158 |
| 490 | 2 | 349 | 166 |
| 491 | 6 | 391 | 178 |
| 492 | 44 | 24 | 182 |
| 493 | 34 | 479 | 183 |
| 494 | 44 | 476 | 184 |
| 495 | 36 | 2 | 188 |
| 496 | 36 | 10 | 191 |
| 497 | 34 | 375 | 193 |
| 498 | 39 | 393 | 197 |
| 499 | 53 | 365 | 243 |
| 500 | 55 | 18 | 247 |
| 501 | 23 | 15 | 261 |
| 502 | 4 | 9 | 270 |
| 503 | 2 | 367 | 286 |
| 16,738 | | 16,738 | |

USA-CERL DISTRIBUTION

Chief of Engineers

ATTN: Tech Monitor
ATTN: CEIM-SL (2)
ATTN: CECC-P
ATTN: CECW
ATTN: CECW-0
ATTN: CECW-P
ATTN: CEEC
ATTN: CEEC-C
ATTN: CEEC-E
ATTN: CERD
ATTN: CERD-C
ATTN: CERD-M
ATTN: CERM
ATTN: DAEN-ZCE
ATTN: DAEN-ZCF
ATTN: DAEN-ZCI
ATTN: DAEN-ZCM
ATTN: DAEN-ZCZ

FESCOM, ATTN: Library 22060
ATTN: DET III 79906

US Army Europe

AEAEN-ODCS/Engr 09403
ISAE 09081

V Corps

ATTN: DEH (11)

VII Corps

ATTN: DEH (15)

21st Support Command

ATTN: DEH (12)

USA Berlin

ATTN: DEH (12)

USASETAF

ATTN: DEH (10)

Allied Command Europe (ACE)

ATTN: DEH (3)

USA Japan (USARJ)

ATTN: AJEN-DEH 96343
ATTN: DEH-Honshu 96343
ATTN: DEH-Okinawa 96331

AMC - Dir., Inst., & Serve

ATTN: DEH (23)
ATTN: AMCEN-A

FORSCOM

FORSCOM Engr, ATTN: AFEN-DEH
ATTN: DEH (23)

HSC

ATTN: HSLO-F 78234
ATTN: Facilities Engineer
Fitzsimons AMC 80240
Walter Reed AMC 20012

INSCOM - Ch, Instl. Div

ATTN: Facilities Engineer (3)

MDW, ATTN: DEH (3)

MTMC

ATTN: MTMC-SA 20315
ATTN: Facilities Engineer (3)

NARADCOM, ATTN: DRDNA-F 01760

TARCOM, Fac. Div. 48090

TRADOC

HQ, TRADOC, ATTN: ATEN-DEH
ATTN: DEH (19)

TSARCOM, ATTN: STSAS-F 63120

USACC, ATTN: Facilities Engr (2)

WESTCOM

ATTN: DEH, Ft. Shafter 96858
ATTN: APEN-IM

HQ USEUCOM 09128

ATTN: ECJ 4/7-LOE

CRREL, ATTN: Library 03755

WES, ATTN: Library 39180

NCEL

ATTN: Library, Code L08A 93043

Defense Technical Info. Center 22314

ATTN: DDA (2)

US Govt Print Office 22304

Receiving Sect/Depository Copies (2)

National Bureau of Standards 20899

END

FILMED

FEB. 1988

DTIC